# SHARP SERVICE MANUAL

**S8606R9H58PJ/**

## CONVECTION
## MICROWAVE OVEN

## MODEL R-9H58

In interests of user-safety the oven should be restored to its original condition and only parts identical to those specified should be used.

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SHARP CORPORATION

# SERVICE MANUAL

SHARP

**CONVECTION**
**MICROWAVE OVEN**

**R-9H58**

**GENERAL IMPORTANT INFORMATION**

This Manual has been prepared to provide Sharp Corp. Service engineers with Operation and Service Information.

It is recommended that service engineers carefully study the entire text of this manual, so they will be qualified to render satisfactory customer service.

**CAUTION**
**MICROWAVE RADIATION**

**DO NOT BECOME EXPOSED TO RADIATION FROM THE MICROWAVE GENERATOR OR OTHER PARTS CONDUCTING MICROWAVE ENERGY.**

Service engineers should not be exposed to the microwave energy which may radiate from the magnetron or other microwave generating devices if it is improperly used or connected. All input and output microwave connections, waveguides, flanges and gaskets must be secured. Never operate the device without a microwave energy absorbing load attached. Never look into an open waveguide or antenna while the device is energized.

**WARNING**

Never operate the oven until the following points are ensured.
(A) The door is tightly closed.
(B) The door brackets and hinges are not defective.
(C) The door packing is not damaged.
(D) The door is not deformed or warped.
(E) There is not any other visible damage with the oven.

Servicing and repair work must be carried out only by trained service engineers.

All the parts marked "*" on parts list are used at voltages more than 250V.

Removal of the outer wrap gives access to potentials above 250V.

All the parts marked "Δ" on parts list may cause undue microwave exposure, by themselves, or when they are damaged, loosened or removed.

**SHARP CORPORATION**

**OSAKA, JAPAN**

PRODUCT SPECIFICATIONS
APPEARANCE VIEW
OPERATING SEQUENCE
FUNCTION OF IMPORTANT COMPONENTS
SERVICING AND TROUBLESHOOTING CHART
TEST PROCEDURE
TOUCH CONTROL PANEL ASSEMBLY
COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE
MICROWAVE MEASUREMENT
WIRING DIAGRAM
PARTS LIST

# PRODUCT SPECIFICATIONS

| ITEM | DESCRIPTION |
|---|---|
| Power Requirements | 230 - 240 Volts<br>50 Hertz<br>Single phase, 3 wire earthed |
| Power Consumption | 1500 W (Microwave)<br>1600 W (Convection) |
| Power Output | 850 watts (IEC-705-1988 )<br>Operating frequency of 2450MHz |
| Convection heater | 1500 W |
| Case Dimensions | Width 627mm<br>Height 378mm<br>Depth 483mm |
| Cooking Cavity Dimensions | Width 410mm<br>Height 245mm<br>Depth 410mm |
| Control Complement | Touch Control System<br>Clock ( 1:00 - 12:59)<br>Timer (0 - 99 min. 99 sec.)<br>Microwave Power for Variable Cooking<br>Repetition Rate;<br>HIGH ..... Full power throughout the cooking time<br>MED HIGH ..... approx. 70% of Full Power<br>MED ..... approx. 50% of Full Power<br>MED LOW (DEFROST) ..... approx. 30% of Full Power<br>LOW ..... approx. 10% of Full Power<br>Convection Temperature for Variable Cooking<br>CONVECTION ..... 40 to 250˚C Temp. control<br>LOW MIX(BAKE) ..... 180˚C with 10% of microwave power<br>HIGH MIX(ROAST) ..... 200˚C with 30% of microwave power<br>GRILL ..... 250˚C (Preheat)<br>HELP pad<br>SENSOR INSTANT ACTION pads<br>MULTI COOK pad<br>REHEAT SENSOR pad<br>CONVECTION COOKING FUNCTION pads<br>EASY DEFROST pad<br>NUMBER and TEMPERATURE pads<br>POWER LEVEL pad<br>MEMORY pad<br>MORE. LESS pads<br>STOP/CLEAR pad<br>CLOCK pad<br>INSTANT COOK/START pad |
| Set Weight | Approx. 29 kg |

# GENERAL INFORMATION

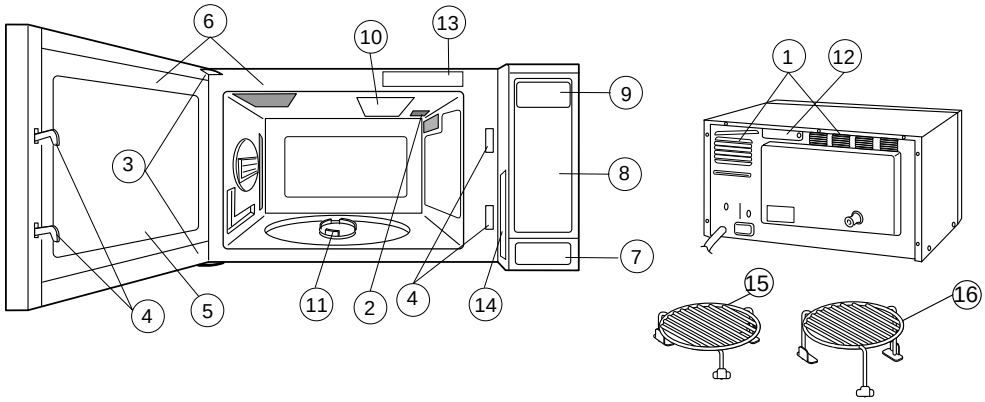
**WARNING**
**THIS APPLIANCE MUST BE EARTHED**

**IMPORTANT**
THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE:

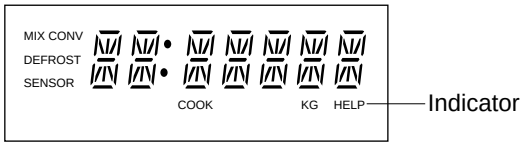
| | |
|---|---|
| GREEN-AND-YELLOW | : EARTH |
| BLUE | : NEUTRAL |
| BROWN | : LIVE |

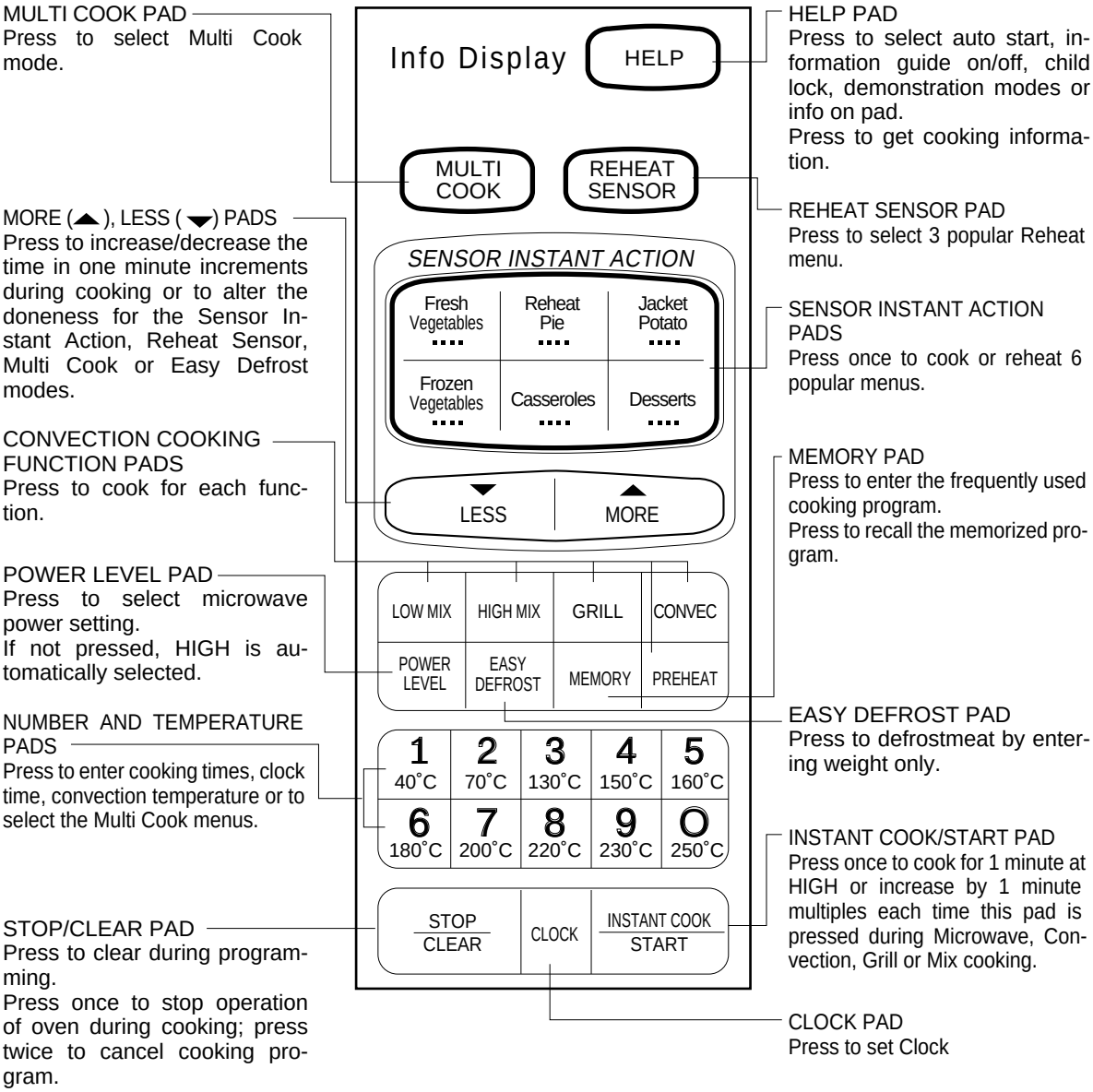
# APPEARANCE VIEW

1. Ventilation opening
2. Oven lamp
3. Door hinges
4. Door safety latches
5. See through door
6. Door seal and sealing surfaces
7. Door open button
8. Touch control panel
9. Digital readout
10. Wave guide cover
11. Coupling
12. Access cover for oven lamp replacement
13. Menu label
14. Rating label
15. low rack
16. High rack




## TOUCH CONTROL PANEL





MULTI COOK PAD
Press to select Multi Cook mode.
MORE (▲), LESS (▼) PADS
Press to increase/decrease the time in one minute increments during cooking or to alter the doneness for the Sensor Instant Action, Reheat Sensor, Multi Cook or Easy Defrost modes.
CONVECTION COOKING FUNCTION PADS
Press to cook for each function.
POWER LEVEL PAD
Press to select microwave power setting.
If not pressed, HIGH is automatically selected.
NUMBER AND TEMPERATURE PADS
Press to enter cooking times, clock time, convection temperature or to select the Multi Cook menus.
STOP/CLEAR PAD
Press to clear during programming.
Press once to stop operation of oven during cooking; press twice to cancel cooking program.
Info Display
HELP
MULTI COOK
REHEAT SENSOR
SENSOR INSTANT ACTION
Fresh Vegetables
Reheat Pie
Jacket Potato
Frozen Vegetables
Casseroles
Desserts
LESS
MORE
LOW MIX
HIGH MIX
GRILL
CONVEC
POWER LEVEL
EASY DEFROST
MEMORY
PREHEAT
1 40˚C
2 70˚C
3 130˚C
4 150˚C
5 160˚C
6 180˚C
7 200˚C
8 220˚C
9 230˚C
0 250˚C
STOP CLEAR
CLOCK
INSTANT COOK START
HELP PAD
Press to select auto start, information guide on/off, child lock, demonstration modes or info on pad.
Press to get cooking information.
REHEAT SENSOR PAD
Press to select 3 popular Reheat menu.
SENSOR INSTANT ACTION PADS
Press once to cook or reheat 6 popular menus.
MEMORY PAD
Press to enter the frequently used cooking program.
Press to recall the memorized program.
EASY DEFROST PAD
Press to defrostmeat by entering weight only.
INSTANT COOK/START PAD
Press once to cook for 1 minute at HIGH or increase by 1 minute multiples each time this pad is pressed during Microwave, Convection, Grill or Mix cooking.
CLOCK PAD
Press to set Clock

# OPERATION SEQUENCE

The following is a description of component functions during oven operation.

**Relay and Components Connection**

| RELAY | CONNECTED COMPONENT |
|---|---|
| RY1 | Oven lamp/ Turntable motor |
| RY2 | Power transformer |
| RY3 | Convection heater |
| RY4 | Damper motor |
| RY5 | Convection motor |
| RY6 | Fan motor |

## OFF CONDITION

Closing the door activates all door interlock switches: upper latch switch, lower latch switch and stop switch. (In this condition, the monitor switch contacts are closed.)
When oven is plugged in a wall outlet (230 - 240V, 50Hz), rated voltage is supplied to the control unit. (Figure O-1):

1. The display flashes “SHARP”, "MICRO-", "WAVE", 'OVEN".
   To set any programmes or set the clock, you must first touch the STOP/CLEAR pad.
   “ : “ appears in the display and the time counts up every minute.

NOTE: When the oven door is opened, the oven lamp comes on at this time.

2. A signal is input to the control unit, energizing the coil of shut-off relay (RY4).
   RY4 contacts close, completing a circuit to the damper motor. The damper motor mow operates moving the damper to the open position, thereby closing the contacts of damper switch inputs a signal to the control unit.
   The coil of relay RY4 is de-energized, opening its contacts, thereby turning off the damper motor.

## MICROWAVE COOKING CONDITION

## HIGH COOKING

Select microwave cooking and power level by pressing the POWER LEVEL pad and then enter cooking time by pressing the NUMBER pads. When the START pad is touched, the following operations occur:

1. The contacts of relays are closed and components connected to relays are turned on (RY1, RY2, RY6). (Figure O-2)
2. Rated voltage is supplied to the primary winding of the power transformer. The voltage is converted to about 3.35 volts A.C. output on the filament winding and high voltage of approximately 2120 volts A.C. on the high voltage winding.
3. The filament winding voltage (3.35 volts) heats the magnetron filament and the high voltage (2120 volts) is sent to the voltage doubling circuit.
4 The 2450 MHz microwave energy produced in the magnetron generates a wave length of 12.24 cm. This energy is channelled through the waveguide (transport channel) into the oven cavity, where the food is placed to be cooked.
5. Upon completion of the cooking time, the power transformer, oven lamp, etc. are turned off and the generation of microwave energy is stopped. The oven will revert to the OFF condition..
6 When the door is opened during a cook cycle, the monitor switch, upper latch switch, lower latch switch and stop switch are activated with the following results. The circuits to the turntable motor, cooling fan motor and high voltage components are de-energized, the oven lamp remains on and the digital read-out displays the time still remaining in the cook cycle when the door was opened.
7. The monitor switch is electrically monitoring the operation of the upper latch switch and lower latch switch and is mechanically associated with the door so that it will function in the following sequence.

1) When the door opens from a closed potion, the upper latch switch and the lower latch switch open their contacts, and then the monitor switch contacts close.
2) When the door is closed, from the open position, the monitor switch contacts first open, and then the contacts of the upper latch switch and lower latch switch must be closed.

If the common and normal open contacts of upper latch switch and the lower latch switch fail with their contacts closed when the door is opened, the closing of the monitor switch contacts will form a short circuit through the fuse, upper latch switch and the lower latch switch, causing the monitor fuse to blow.

## MEDIUM HIGH, MEDIUM, MEDIUM LOW, LOW COOKING

When variable cooking power is programmed, the rated voltage is supplied to the power transformer intermittently through the contacts of the relay (RY2) which is operated by the control unit within a 32-second time base. Microwave power operation is follows:

| VARI MODE | ON TIME | OFF TIME |
|---|---|---|
| HIGH (100% power) | 32 sec. | 0 sec. |
| MED HIGH (approx. 70% power) | 24 sec. | 8 sec. |
| MED (approx. 50% power) | 18 sec. | 14sec. |
| MED LOW (approx. 30% power) | 12 sec. | 20 sec. |
| LOW (approx. 10% power) | 6 sec. | 26 sec. |

NOTE: TheON/OFF time ratio does not exactly correspond to the percentage of microwave power, because approx. 2 seconds are needed for heating up the magnetron filament.

## CONVECTION COOKING CONDITION

### PREHEATING CONDITION

Press the PREHEAT pad and then select preheating temperature by pressing the temperature pad. When the START pad is touched, the following operations occur:

1. The coil of shut-off relays RY1+RY5+RY6 are energized, the oven lamp, cooling fan motor, turntable motor and convection motor are turned on.
2. The coil of relay (RY4) is energized by the CPU unit. The damper is moved to the closed position, opening the damper switch contacts. The opening of the damper switch contacts sends a signal to the LSI on the CPU

unit de-energizing the relay (RY4) and opening the circuit to the damper motor.
3. The coil of heater relay (RY3) is energized by the CPU unit and the main supply voltage is added to the convection heater.
4. When the oven temperature reaches the selected preheat temperature, the following operations occur:
4-1. The heater relay (RY3) is de-energized by the CPU unit temperature circuit and thermistor, opening the circuit to the convection heater.
4-2. The oven will continue to function for 30 minutes, turning the convection heater on and off, as needed to maintain the selected preheat temperature. The oven will shut-down completely after 30 minutes.

## CONVECTION COOKING CONDITION

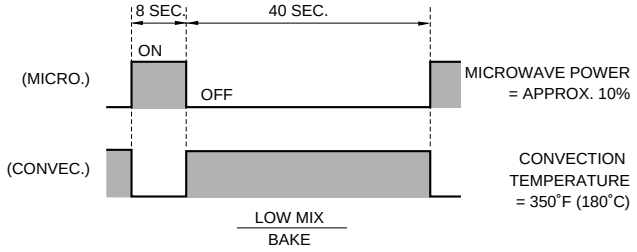
When the preheat temperature is reached, a beep signal will sound indicating that the holding temperature has been reached in the oven cavity. Open the door and place the food to be cooked in the oven. Press the CONVECTION pad and then enter the cooking temperature by pressing the temperature pad. And then enter the cooking time by pressing the NUMBER pads. When the START pad is touched, the following operations occur:
1. The numbers of the digital read-out start the count down to zero.
2. The oven lamp, turntable motor, cooling fan motor and convection motor are energized.
3. Heater relay (RY3) is energized (if the cavity temperature is lower than the selected temperature) and the main supply voltage is applied to the convection heater to return to the selected cooking temperature.
4. Upon completion of the cooking time, the audible signal will sound, and oven lamp, turntable motor, cooling fan motor and convection motor are de-energized. At the end of the convection cycle, if the cavity air temperature is above 116˚C, the circuit to (RY6) will be maintained (by the thermistor circuit) to continue operation of the cooling fan motor until the temperature drops below 116˚C, at which time the relay will be de-energized, turning off the fan motor. Relay (RY5) will however, open as soon as the convection cycle has ended, turning off the convection fan motor. This will now cool and allow the damper door to open.
5. At the end of the convection cook cycle, shut-off relay (RY4) is energized turning on the damper motor. The damper is returned to the open position, closing the damper switch contacts which send a signal to the control unit, de-energizing shut-off relay (RY4).

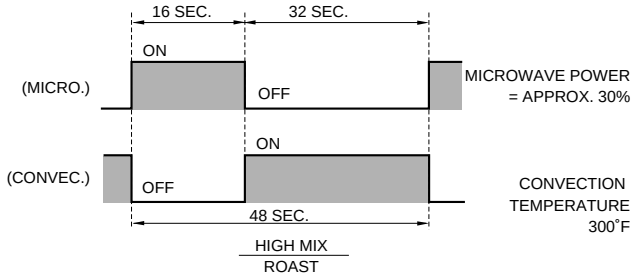
## AUTOMATIC MIX COOKING CONDITION

Choose the LOW MIX or HIGH MIX by pressing the LOW MIX pad or HIGH MIX pad. And then enter cooking time by pressing the NUMBER pads. When the START pad is touched, the following operations occur:
1. The numbers of the digital read-out start the count down to zero.
2. The shut-off relay (RY1+RY5+RY6) energized, turning on the oven lamp, turntable motor, cooling fan motor and convection motor.
3. The shut-off relay (RY4) is energized.
The damper door is closed from the open position.
4. The heater relay (RY3) is energized, adding the mains supply voltage to the convection heater.
5. Now, the oven is in the convection cooking condition.
6. When the oven temperature reaches the selected temperature, the following operations occur:
6-1. The power supply voltage is added to the convection heater and power transformer alternately.
6-2. The convection heater operates through the heater relay (RY3) contacts and the power transformer operates through the cook relay (RY2) contacts.
6-3. These are operated by the CPU unit to supply alternately within a 48 second time base, convection heat and microwave energy.

The relationship between the convection and microwave power operations are as follows.

Note: The ON and OFF time ratio does not correspond with the percentage of microwave power, because approx. 2 seconds are needed for heating of the magnetron filament.

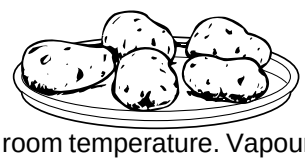


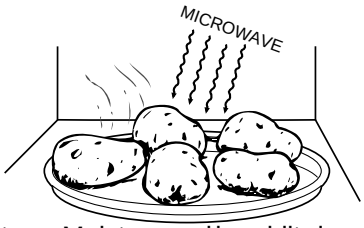

Note: During alternate Microwave/Convection operation, the convection heater is energized only if the cavity temperature drops below the set temperature.

## ABSOLUTE HUMIDITY SENSOR (AH SENSOR) COOKING CONDITION

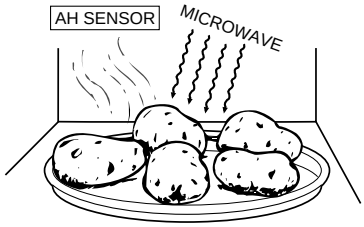
In case where the AH sensor is used (REHEAT SENSOR or SENSOR INSTANT ACTION), the foods are cooked in microwave cooking mode without figuring time, power level or quantity. When the oven senses enough steam from the food, it relays the information to its microprocessor which will calculate the remaining cooking time and power level needed for best results. When the food is cooked, water vapour is developed. The sensor “senses” the vapour and its resistance increases gradually. When the resistance reaches the value set according to the menu, supplementary cooking is started. The time of supplementary cooking is determined by experiment with each food category and inputted into the LSI.
An example of how sensor works:



1. Potatoes at room temperature. Vapour is emitted very slowly.




2. Heat potatoes. Moisture and humidity is emitted rapidly. You can smell the aroma as it cooks. ;




3. Sensor detects moisture and humidity and calculates cooking time and variable power.

## AH SENSOR COOKING SEQUENCE

1. In case the AH sensor cooking condition is started, the coil of shut-off relays (RY1+RY6) are energized, the oven lamp and cooling fan motor are turned on, but the power transformer is not turned on.

NOTE: The oven should not be operated on AH SENSOR COOKING immediately after plugging in the unit. Wait five minutes before cooking on AH SENSOR COOKING CONDITION.

2. After about 16 seconds, the cook relay (RY2) is energized. The power transformer is turned on, microwave energy is produced and first stage is started. The 16 seconds is the cooling time required to remove any vapour from the oven cavity and sensor. (Figure O-2)

NOTE: During this first stage, do not open the door or touch STOP/CLEAR pad.

3. The oven will go to the Mix Cooking Condition at the 2nd. or 3rd. stage when Reheat pie, Casseroles or Desserts has been chosen. (Figure O-4)
4. When the sensor detects the vapour emitted from the food, the display switches over to the remaining cooking time and the timer counts down to zero. At this time, the door may be opened to stir food, turn it or season, etc.

NOTE: In case where a small quantity of food is cooked, the oven will stop without displaying the remaining cooking time.

5. When the timer reaches zero, an audible signal sounds. The shut-off relay (RY1+RY6) and cook relay (RY2) are de-energized and the power transformer, oven lamp, etc. are turned off.
6. Opening the door or touching the STOP/CLEAR pad, the time of day will reappear on the display and the oven will revert to an OFF condition.

## MULTI COOK

MULTI COOK will automatically compute the oven temperature, microwave power and cooking time for baking and roasting. Set the desired program by touching the MULTI COOK pad, and number pad. Enter the weight by touching the Number pads. When the START pad is touched, the following operations occur:

1. The COOK indicator will light and the Microwave Symbol and/or the Convection Fan Symbol will rotate.
2. The cooking time will appear on the display and start counting down to zero. The cooking time is adjusted automatically according to the weight of the food.
3. The shut-off relays (RY1, RY3, RY5 and RY6) are energized, turning on the oven lamp, turntable motor, cooling fan motor and convection motor. The power supply voltage is added to the convection heater.
4. Now, the oven is in the convection cooking mode.
5. When the oven temperature has reached the programmed convection temperature, the oven goes into the programmed cooking mode.
6. At the end of the MULTI COOK cycle, the damper is returned to the open position and the oven will go to the off condition. The cooling fan will remain on until the oven has cooled.

## EASY DEFROST COOKING

The EASY DEFROST key is a special function key to defrost meats and poultry faster and better.
EASY DEFROST key has 4 defrost stages.
EASY DEFROST automatically defrosts roast beef, etc.
When EASY DEFROST is selected and the food weight is entered by using the number pads, the oven will cook according to the special cooking sequence. (Figure O-2)

## FIRE SENSING FEATURE (MICROWAVE MODE)

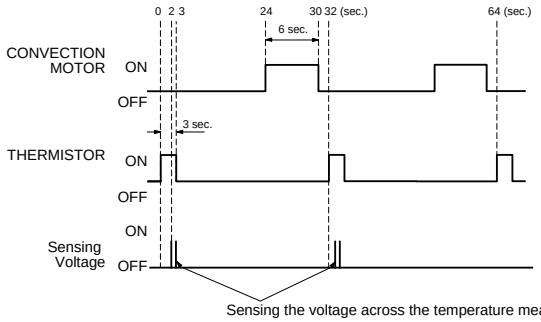
This model incorporates a sensing feature which will stop the oven's operation if there is a fire in the oven cavity during microwave cooking.
This accomplished by the LSI repeatedly measures the voltage across the temperature measurement circuit (thermistor) during it's 32-seconds time base comparing the obtained voltage measurements. If the most recent voltage measured is 300mV grater than the previous voltage measured, the LSI judges it as a fire in the oven cavity and switches off the relays to the power transformer, fan motor and convection motor. The LSI also stops counting down and closes the damper door so that no fresh air will enter the oven cavity. Please refer to the following section for a more detailed description.

**Operation**

Please refer to the timing diagrams below.

1. The thermistor operates within a 32-seconds time base and it is energized for three (3) seconds and off for 29 seconds. Two (2) seconds after the thermistor is energized, the voltage across the temperature measurement circuit is sampled by the LSI and twenty one (21) seconds after the thermistor is cut off the LSI turns on the cooling fan for six (6) seconds.
2. The above procedure is repeated. If the difference between the first voltage measured (in step 1) and the voltage measured when the procedure is repeated (step 2) is greater than 300mV the LSI makes the judgment that there is a fire in the oven cavity and will switch off the relays to the power transformer, fan motor and convection motor. The LSI also stops counting down and closes the damper door so that no fresh air will enter the oven cavity.
3. Once the fire sensor feature has shut the unit down, the programmed cooking cycle may be resumed by pressing the "START" pad or the unit may be reset by pressing the "CLEAR" pad.

**IMPORTANT:**
**During sensor cooking operation, the fire sensing operation sequence will not begin until the AH sensor has detected vapours and initiated a sensor cooking cycle. This is because the operation of the convection fan would interfere with the AH sensor's vapour detection.**




# FUNCTION OF IMPORTANT COMPONENTS

## UPPER AND LOWER LATCH SWITCHES

Those latch switches are mounted in the latch hooks as shown in figure. They are activated by the latch heads on the door.
When the door is opened, the switches interrupt the circuit to all components except CPU unit and relay unit and oven lamp. A cook cycle cannot take place until the door is firmly closed thereby activating both interlock switches.

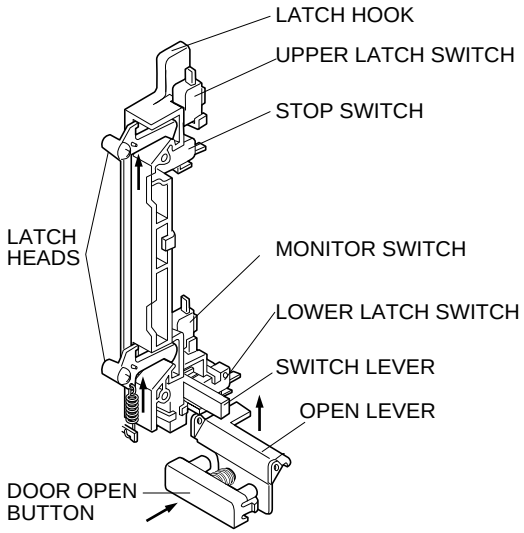



**Figure D-1. Switches**

## MONITOR SWITCH

The monitor switch is mounted on the latch hook. It is activated (the contacts opened) by the lower latch head when the door is closed. The switch is intended to render the oven inoperative by means of blowning the fuse when the contacts of the common and normal open contacts of upper latch switch and lower latch switch
fail to open when the door is opened.

**Functions:**

1. When the door is opened, the monitor switch contacts close (to the ON condition) due to their being normally closed. At this time the common and normal open contacts of upper latch switch and lower latch switch are in the OFF condition (contacts open) due to their being normally open contacts switch.
2. As the door goes to a closed position, the monitor switch contacts are first opened and then the common and normal open contacts of upper latch switch close. (On opening the door, each of these switches operate inversely.)
3 If the door is opened during cooking, and the common and normal open contacts of upper latch switch and lower latch switch fail to open, the fuse blows simultaneously with closing of the monitor switch contacts.

CAUTION: BEFORE REPLACING A BLOWN FUSE TEST THE UPPER LATCH SWITCH, LOWER LATCH SWITCH AND MONITOR SWITCH FOR PROPER OPERATION. (REFER TO CHAPTER “TEST PROCEDURE”).

## STOP SWITCH

The stop switch is activated by the latch head.
When the door is opened while the oven is in cook cycle, the stop switch contacts open to de-energize the relay (RY-1,RY-2,RY-3,RY-5,RY-6). Then the cook cycle is stopped.

## THERMAL CUT-OUT 150˚C (OVEN)

The oven thermal cut-out located on the left side of the thermal protection plate is designed to prevent damage to the convection heater unit if an overheated condition develops in the tube due to cooling fan failure, obstructed air ducts, dirty or blocked air intake, etc. Under normal operation, the oven thermal cut-out remains closed. However, when abnormally high temperatures are reached within the heater unit, the oven thermal cut-out will open, causing the oven to shut down. When the oven has cooled temperature, the oven thermal cut-out closes.

## THERMAL CUT-OUT 95˚C (FAN MOTOR)

The thermal cut-out protect the fan motor against overheating. If its temperature goes up higher than 95˚C because the fan motor is locked or the ventilation operating are blocked, the contacts of the thermal cut-out will open and switch off the oven. When the thermal cut-out cools itself down to 75˚C, the contacts of the thermal cut-out will close again.

## TEMPERATURE FUSE 150˚C (MG)

This fuse protects the magnetron against overheating. If the temperature goes up higher than 150˚C because the fan motor is interrupted, the air inlet duct is blocked or the ventilation openings are obstructed, the fuse blows and cuts off the power supplying to the power transformer. The defective fuse must be replaced with new rated one.

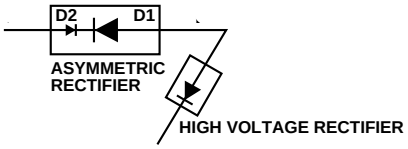
## FUSE M8A 250V

1. If the wire harness or electrical components are short-circuited, this fuse blows to prevent an electric shock or fire hazard.

2. The fuse also blows when upper latch switch and lower latch switch remain closed with the oven door open and when the monitor switch closes.
3. The fuse M8A also blows when asymmetric rectifier, H.V. rectifier, H.V. wire harness, H.V. capacitor, magnetron or secondary winding of power transformer is shorted.

## ASYMMETRIC RECTIFIER

The asymmetric rectifier is a solid state device that prevents current flow ins both directions. And it prevents the temperature rise of the power transformer by blowing the fuse M8A when the high voltage rectifier is shorted.




The rated peak reverse voltage of D1 of the asymmetric rectifier is 6 KV The rated peak reverse voltage of D2 of the asymmetric rectifier is 1.7 KV. D1 and D2 of the asymmetric rectifier or high voltage rectifier are shorted when the each peak reverse voltage goes beyond the each rated peak reverse voltage. (The process of blowing the fuse M8A.) .

1. The high voltage rectifier is shorted by any causes when microwave cooking.
2. The peak reverse voltage of D2 of the rectifier goes beyond the rated peak reverse voltage 1.7 KV in the voltagedoubler circuit.
3. D2 of the rectifier is shorted.
4. The large electric currents flow through the high voltage winding of the power transformer.
5. The large electric currents beyond 8A flow through the primary winding of the power transformer.
6. The fuse M8A blows by the large electric currents.
7. The power supply to the power transformer is cut off.

## THERMISTOR

The thermistor is a negative temperature coefficient type. The temperature in the oven cavity is detected through the resistance of the thermistor, and then the control unit causes the heating element relay to operate, thus the current to the heating element is turned ON/OFF.

## MONITOR RESISTOR

The monitor resistor prevents the fuse M8A 250V bursting when the fuse M8A 250V blows due to the operation of the monitor switch.

## TURNTABLE MOTOR

The turntable motor drives the turntable supporting plate to rotate the turntable.

## CONVECTION MOTOR

The convection motor drives the convection fan and provides the heated air.

## FAN MOTOR

The fan motor drives a blade which draws external cool air. This cool air is directed through the air vanes surrounding the magnetron and cools the magnetron. This air is channelled through the oven cavity to remove steam and vapours given off from the heating foods. It is then exhausted through the exhausting air vents at the oven cavity.

## CONVECTION HEATER

The convection heater is located at the rear of the oven cavity. It is intended to heat air driven by the convection fan. The heated air is kept in the oven and force-circulated and reheated by the convection heater.

## CONVECTION COOKING SYSTEM

This oven is designed with a hot air heating system where food is not directly heated by the convection heater, but is heated by forced circulation of the hot air produced by the convection heater. The air heated by the convection heater is circulated through the convection passage provided on the outer casing of the oven cavity by means of the convection fan which is driven by the convection motor. It then enters the inside of the oven through the vent holes provided on the left side of the oven. Next, the hot air heats the food on the turntable and leaves the oven cavity through the vent in the oven cavity left side wall. Without leaving the oven, this hot air is reheated by the convection heater, passes through the convection passage and enters the inside of the oven cavity again, in a continuing cycle. In this way, the hot air circulates inside the oven cavity to raise its temperature and, at the same time, comes into contact with the food being cooked. When the temperature inside the oven cavity reaches the selected temperature, the convection heater is de-energized. When the temperature inside the oven cavity drops below the selected temperature, the convection heater is energized again. In this way, the inside of the oven cavity is maintained at approximately the selected temperature.

When the convection time reaches 0, the convection heater is de-energized and the convection fan stops operating and the oven shuts off. Upon completion of the cooking time, the audible signal will sound, and oven lamp, turntable motor, cooling fan motor and convection motor are de-energized. At the end of the convection cycle, if the cavity air temperature is above 116˚C, the circuit to RY6 will be maintained (by the thermistor circuit) to continue operation of the cooling fan motor until the temperature drops below 116˚C, at which time the relay will be de-energized, turning off the fan motor. Relay RY5 will however, open as soon as the convection cycle has ended, turning off the convection fan motor. This will now cool and allow the damper door to open.

## DAMPER OPEN-CLOSE MECHANISM

Usually, the damper is in the open position except during convection cooking.

Damper position is set automatically by damper motor, damper switch, motor cam and damper shaft.

These components are operated by a signal that judges if microwave cooking or convection cooking operation is selected by the CPU unit.

**Microwave Cooking:**

Damper is in the open position, because a portion of cooling air is channelled through the cavity to remove steam and vapours given off from the heating foods.

It is then exhausted at the top of the oven cavity into a condensation compartment.

**Convection Cooking:**
Damper is in the closed position, so that no hot air will be allowed to leak out the oven cavity.

**Damper Operation**

1. When power supply cord is plugged in:
1-1. When power supply cord is plugged in, a signal is sensed in the control unit, and operates shut-off relay (RY4).
1-2. Contacts of shut-off relay (RY4) close, the damper motor is energized, opening the damper door.
1-3. When the damper is moved to the open position by the damper cam, damper switch is closed (ON position).
1-4. The signal of damper switch is re-sensed in the control unit and shut-off relay (RY4) is turned off.
1-5. The rated voltage to the damper motor is stopped and the motor turns off.
2. When oven is microwave cooking:
Damper is in the open position
3. When oven is convection cooking:
3-1 Damper motor is energized by touching the convection, temperature and START pads.
3-2. When damper is in the closed position (damper switch is OFF), its signal is sensed by the control unit, and shut-off relay (RY4) is de-energized.
3-3. The damper is held in the closed position during the convection cooking operation.
3-4. At the end of the convection cooking, shut-off relay (RY4) is energized, and the damper is returned to the open position.

NOTE: If the damper door is not in the proper position, closed during convection or open during microwave, the control unit will stop oven operation after 1 minute.

| Cooking Mode | Operation of Damper |
|---|---|
| Microwave cooking | OPEN |
| Convection cooking | CLOSE |
| Sensor cooking | OPEN |
| Automatic mix cooking | CLOSE |
| Grill cooking | CLOSE |
| Slow cooking | CLOSE |

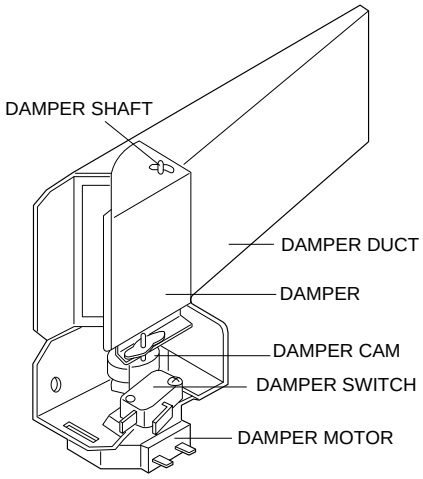



**Figure D-2. Damper Mechanism**

## NOISE FILTER

The noise filter prevents the radio frequency interference that might flow back in the power circuit.

# SERVICING

## WARNING TO SERVICE PERSONNEL

Microwave ovens contain circuitry capable of producing very high voltage and current, contact with any part of the high voltage circuit will result in electrocution. High voltage capacitor, Power transformer, Magnetron, High voltage rectifier assembly, High voltage harness.

**REMEMBER TO CHECK 3D**

1) Disconnect the supply.
2) Door opened, and wedged open.
3) Discharge high voltage capacitor.

WARNING: AGAINST THE CHARGE OF THE HIGH-VOLTAGE CAPACITOR

The high-voltage capacitor remains charged about 60 seconds after the oven has been switched off. Wait for 60 seconds and then short-circuit the connection of the high-voltage capacitor (that is, of the connecting lead of the high-voltage rectifier) against the chassis with the use of an insulated screwdriver.

Sharp recommend that wherever possible fault-finding is carried out with the supply disconnected. It may in, some cases, be necessary to connect the supply after the outer case has been removed, in this event carry out 3D checks and then disconnect the leads to the primary of the power transformer. Ensure that these leads remain isolated from other components and the oven chassis. (Use insulation tape if necessary.) When the testing is completed carry out 3D checks and reconnect the leads to the primary of the power transformer.

**REMEMBER TO CHECK 4R**

1) Reconnect all leads removed from components during testing.
2) Replace the outer case (cabinet).
3) Reconnect the supply.
4) Run the oven. Check all functions.

Microwave ovens should not be run empty. To test for the presence of microwave energy within a cavity, place a cup of cold water on the oven turntable, close the door and set the microwave timer for two (2) minutes. Set the power level to HIGH and push the START button. When the two minutes has elapsed (timer at zero) carefully check that the water is now hot. If the water remains cold carry out 3D checks and re-examine the connections to the component being tested.

When all service work is completed, and the oven is fully assembled, the microwave power output should be checked and microwave leakage test carried out

# TROUBLESHOOTING GUIDE

When troubleshooting the microwave oven, it is helpful to follow the Sequence of Operation in performing the checks. Many of the possible causes of trouble will require that a specific test be performed. These tests are given a procedure letter which will be found in the "Test Procedure "section.

IMPORTANT: If the oven becomes inoperative because of a blown fuse M8A in the upper latch switch - lower latch switch - monitor switch - monitor resistor circuit, check the upper latch switch, lower latch switch, monitor switch and monitor resistor before replacing the fuse M8A.

CK = Check / RE = Replace

| TEST PROCEDURE | | A | B | C | D | E | E | E | F | G | G | H | I | J | J | J | J | K | M | N | O | O | O | O | O | O | P | Q | RE | CK | CK | CK | RE | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CONDITION | PROBLEM / POSSIBLE CAUSE AND DEFECTIVE PARTS | MAGNETRON | POWER TRANSFORMER | H.V. RECTIFIER ASSEMBLY | HIGH VOLTAGE CAPACITOR | LATCH AND STOP SWITCHES | MONITOR SWITCH | DAMPER SWITCH | MAIN FUSE | TEMPERATURE FUSE 150°C | THERMAL CUT-OUT | CONVECTION HEATER | THERMISTOR | FAN MOTOR | TURNTABLE MOTOR | CONVECTION MOTOR | DAMPER MOTOR | MONITOR RESISTOR | TOUCH CONTROL PANEL | KEY UNIT | RELAY (RY-1) | RELAY (RY-2) | RELAY (RY-3) | RELAY (RY-4) | RELAY (RY-5) | RELAY (RY-6) | FOIL PATERN ON P.W.B. | AH. SENSOR | OVEN LAMP OR SOCKET | OPENED OR SHORTED WIRE HARNESS | WALL OUTLET | LOW POWER SUPPLY VOLTAGE | SHORTED POWER CORD | NOISE FILTER |
| OFF CONDITION | Home fuse blows when power supply cord is plugged into wall outlet. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ○ | |
| | Fuse M8A blows when power cord is plugged into wall outlet. | | | | | | ○ | | | | | | | | | | | | | | | | | | | | | | | ○ | | | | ○ |
| | Display does not show anything when power cord is first plugged into wall outlet. | | | | | | | | ○ | ○ | ○ | | | | | | | | ○ | | | | | | ○ | | ○ | | | ○ | ○ | | | ○ |
| | Display does not operate properly when STOP/ CLEAR pad is touched. (The time of day should appear on the display with beep sound during normal condition.) | | | | | ○ | | | | | | | | | | | | | ○ | ○ | | | | | | | | | | ○ | | | | |
| | Oven lamp does not light with door opened. | | | | | ○ | | | ○ | ○ | ○ | | | | | | | | ○ | | ○ | | | | | | | | ○ | ○ | | | | |
| COOKING CONDITION | Oven lamp does not light at all | | | | | | | | | | | | | | | | | | | | ○ | | | | | | | | ○ | ○ | | | | |
| | Oven lamp light, but turntable motor does not operate. | | | | | ○ | | | | | | | | | ○ | | | | ○ | | | | | | | | | | | ○ | | | | |
| | Cooling fan motor does not operate. | | | | | | | | | | | | | ○ | | | | | ○ | | | | | | | ○ | | | | ○ | | | | |
| | The oven stops after1 minute | | | | | | | ○ | | | | | | | | | ○ | | | | | | | ○ | | | | | | ○ | | | | |
| (MICROWAVE) | Oven does not go into a cook cycle, when START pad is touched. | | | | | ○ | | | | | | | | | | | | | ○ | ○ | | | | | | | | | | ○ | | | | |
| | Low or no power is produced during microwave cooking (The food is heated incompletely or not heated at all) | ○ | ○ | ○ | ○ | | | | | | | | | | | | | | ○ | | | ○ | | | | | | | | ○ | | | | |
| | Extremely uneven heating is produced in oven load (food). | | | | | | | | | | | | | | ○ | | | | | | ○ | | | | | | | | | ○ | | | | |
| | Function of variable cooking does not operate properly except HIGH power. | | | | | | | | | | | | | | | | | | ○ | ○ | | | | | | | | | | | | | | |
| (CONVECTION) | CONV indicator lights, but heating element does not heat. | | | | | | | | | | | ○ | ○ | | | | | | ○ | | | | ○ | | | | | | | ○ | | ○ | | |
| | Temperature in the oven cavity is lower or higher than preset. | | | | | | | | | | | ○ | ○ | | | ○ | | | ○ | | | | ○ | ○ | ○ | | | | | ○ | | ○ | | |
| | Convection cycle runs 1 minute then the oven shuts down. | | | | | | | ○ | | | | | | | | | ○ | | ○ | | | | | ○ | | | | | | ○ | | | | |
| | Convection cycle runs 3 minutes then the oven shuts down. | | | | | | | | | | | ○ | ○ | | | | | | | | | | ○ | | | | | | | ○ | | | | |
| (AH. SENSOR) | Oven is in the sensor cooking condition but AH sensor does not end 1st. stage or does not stop cooking cycle or the oven stops soon. | | | | | | | | | | | | | | | | | | ○ | | | | | | | | | ○ | | ○ | | | | |

## TEST PROCEDURES

| PROCEDURE LETTER | COMPONENT TEST |
|---|---|

**A** **MAGNETRON TEST**

> NEVER TOUCH ANY PART IN THE CIRCUIT WITH YOUR HAND OR AN INSULATED TOOL WHILE THE OVEN IS IN OPERATION.

CARRY OUT 3D CHECK.

Isolate the magnetron from high voltage circuit by removing all leads connected to filament terminal.

To test for an open circuit filament use an ohmmeter to make a continuity test between the magnetron filament terminals, the meter should show a reading of less than 1 ohm.

To test for short filament to anode condition, connect ohmmeter between one of the filament terminals and the case of the magnetron (ground). This test should be indicated an infinite resistance. If a low or zero resistance reading is obtained then the magnetron should be replaced.

**MICROWAVE OUTPUT POWER (1 Litre water load)**

The following test procedure should be carried out with the microwave oven in a fully assembled condition (outer case fitted). Microwave output power from the magnetron can be measured by way of IEC 705, i.e. it can be measured by using water load how much it can be absorbed by the water load. To measure the microwave output power in the microwave oven, the relation of calorie and watt is used. When P(W) heating works for t(second), approximately P x t/4.187 calorie is generated. On the other hand, if the temperature of the water with V(ml) rises $\Delta$T (°C) during this microwave heating period, the calorie of the water is V x $\Delta$T.

> The formula is as follows;
> P x t / 4.187 = V x $\Delta$ T  P (W) = 4.187 x V x $\Delta$T / t
> Our condition for water load is as follows:
> Room temperature.....around 20°C  Power supply Voltage.....Rated voltage
> Water load.....1000 g  Initial temperature.....10±2°C  Heating time.....49 sec.
> P = 85 x $\Delta$T

Measuring condition:

1. Container
   The water container must be a cylindrical borosilicate glass vessel having a maximum material thickness of 3 mm and an outside diameter of approximately 190 mm.
2. Temperature of the oven and vessel
   The oven and the empty vessel are at ambient temperature prior to the start the test.
3. Temperature of the water
   The initial temperature of the water is (10±2)°C.
4. Select the initial and final water temperature so that the maximum difference between the final water temperature and the ambient temperature is 5°C.
5. Select stirring devices and measuring instruments in order to minimize addition or removal of heat.
6. The graduation of the thermometer must be scaled by 0.1°C at minimum and accurate thermometer.
7. The water load must be (1000±5) g.
8. "t" is measured while the microwave generator is operating at full power. Magnetron filament heat-up time is not included.

NOTE: The operation time of the microwave oven is "t + 2" sec. 2 sec. is magnetron filament heat-up time.

Measuring method:

1. Measure the initial temperature of the water before the water is added to the vessel. (Example: The initial temperature T1 = 11°C)
2. Add the 1 litre water to the vessel.
3. Place the load on the centre of the shelf.
4. Operate the microwave oven at HIGH for the temperature of the water rises by a value $\Delta$ T of (10 ± 2)°C.
5. Stir the water to equalize temperature throughout the vessel.
6. Measure the final water temperature. (Example: The final temperature T2 = 21°C)
7. Calculate the microwave power output P in watts from above formula.

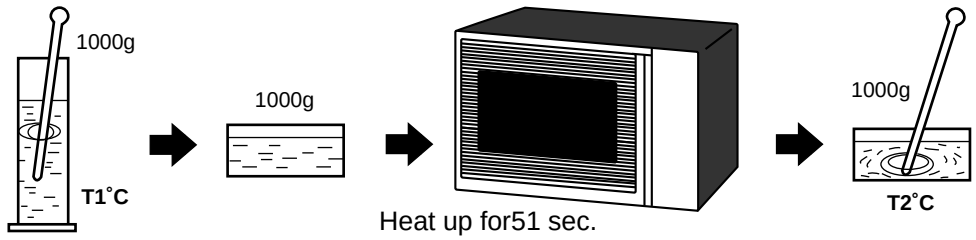
**TEST PROCEDURES**

| PROCEDURE LETTER | COMPONENT TEST |
|---|---|

Initial temperature ..... T1 = 11°C
Temperature after (49 + 2) = 51 sec. ..... T2 = 21°C
Temperature difference Cold-Warm ..... ΔT1 = 10°C
Measured output power
The equation is "P = 85 x ΔT" ..... P = 85 x 10°C = 850 Watts

**JUDGMENT: The measured output power should be at least ± 15 % of the rated output power.**

CAUTION: 1°C CORRESPONDS TO 85 WATTS REPEAT MEASUREMENT IF THE POWER IS INSUFFICIENT.




**B** **POWER TRANSFORMER TEST**

**WARNING: High voltages and large currents are present at the secondary winding and filament winding of the power transformer. It is very dangerous to work near this part when the oven is on. NEVER make any voltage measurements of the high-voltage circuits, including the magnetron filament.**

CARRY OUT 3D CHECKS.

Disconnect the leads to the primary winding of the power transformer. Disconnect the filament and secondary winding connections from the rest of the HV circuitry. Using an ohmmeter, set on a low range, it is possible to check the continuity of all three windings. The following readings should be obtained:

a. Primary winding ..... approx. 1.3 Ω
b. Secondary winding ..... approx. 72 Ω
c. Filament winding ..... less than 1Ω

If the reading obtained are not stated as above, then the power transformer is probably faulty and should be replaced.

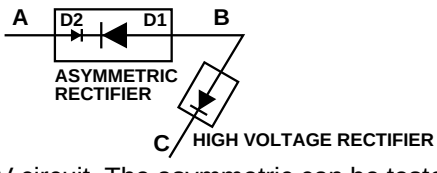
CARRY OUT 4R CHECKS.

**C** **HIGH VOLTAGE RECTIFIER ASSEMBLY TEST**

HIGH VOLTAGE RECTIFIER TEST
CARRY OUT 3D CHECKS.
Isolate the high voltage rectifier assembly from the HV circuit. The high voltage rectifier can be tested using an ohmmeter set to its highest range. Connect the ohmmeter across the terminal B+C of the high voltage rectifier and note the reading obtained. Reverse the meter leads and note this second reading. The normal resistance is infinite in one direction and more than 100 kΩ in the other direction.

CARRY OUT 4R CHECKS.
ASYMMETRIC RECTIFIER TEST

CARRY OUT 3D CHECKS.




Isolate the high voltage rectifier assembly from the HV circuit. The asymmetric can be tested using an ohmmeter set to its highest range across the terminals A+B of the asymmetric rectifier and note the reading obtained. Reverse the meter leads and note this second reading. If an open circuit is indicated in both direction then the asymmetric rectifier is good. If an asymmetric rectifier is shorted in either direction, then the asymmetric rectifier is probably faulty and must be replaced with high voltage rectifier. When the asymmetric rectifier is defective, check whether magnetron, high voltage

**TEST PROCEDURES**

| PROCEDURE LETTER | COMPONENT TEST |
|---|---|

rectifier, high voltage wire or filament winding of the power transformer is shorted.

CARRY OUT 4R CHECKS.

NOTE: FOR MEASUREMENT OF THE RESISTANCE OF THE RECTIFIER, THE BATTERIES OF THE MEASURING INSTRUMENT MUST HAVE A VOLTAGE AT LEAST 6 VOLTS, BECAUSE OTHERWISE AN INFINITE RESISTANCE MIGHT BE SHOWN IN BOTH DIRECTIONS.

**D** **HIGH VOLTAGE CAPACITOR TEST**

CARRY OUT 3D CHECKS.

A. Isolate the high voltage capacitor from the circuit.
B. Continuity check must be carried out with measuring instrument which is set to the highest resistance range.
C. A normal capacitor shows continuity for a short time (kick) and then a resistance of about 10MΩ after it has been charged.
D. A short-circuited capacitor shows continuity all the time.
E. An open capacitor constantly shows a resistance about 10 MΩ because of its internal 10MΩ resistance.
F. When the internal wire is opened in the high voltage capacitor shows an infinite resistance.
G. The resistance across all the terminals and the chassis must be infinite when the capacitor is normal.

If incorrect reading are obtained, the high voltage capacitor must be replaced.

CARRY OUT 4R CHECKS.

**E** **SWITCH TEST**

CARRY OUT 3D CHECKS.

Isolate the switch to be tested and using an ohmmeter check between the terminals as described in the following table.

Table: Terminal Connection of Switch

| Plunger Operation | COM to NO | COM to NC |
|---|---|---|
| Released | Open Circuit | Short Circuit |
| Depressed | Short Circuit | Open Circuit |

COM; Common terminal
NO; Normally open terminal
NC; Normally close terminal

If incorrect readings are obtained, make the necessary switch adjustment or replace the switch.

CARRY OUT 4R CHECKS.

**F** **BLOWN FUSE F M8A**

CARRY OUT 3D CHECKS.

1. If the fuse M8A is blown, there could be shorts or grounds in electrical parts or wire harness. Check them and replace the defective parts or repair the wire harness.
2. If the fuse M8A is blown when the door is opened, check the upper latch switch, lower latch switch, monitor switch and monitor resistor.

   If the fuse M8A is blown by incorrect door switching, replace the defective switch(s) and the fuse M8A.
3. If the fuse M8A is blown, there could be short in the asymmetric rectifier or there is a ground in wire harness. A short in the asymmetric rectifier may have occured due to short or ground in H.V. rectifier, magnetron, power transformer or H.V. wire. Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS.

CAUTION: Only replace fuse with the correct value replacement.

**G** **TEMPERATURE FUSE AND THERMAL CUT-OUT TEST**

CARRY OUT 3D CHECKS.

Disconnect the leads from the terminals of the temp. fuse or thermal cut-out. Then using an ohmmeter, make a continuity test across the two terminals as described in the table below.

CARRY OUT 4R CHECKS.

## TEST PROCEDURES

| PROCEDURE LETTER | COMPONENT TEST |
|---|---|

Table: Temperature Fuse and Thermal cut-out Test

| Parts Name | Temperature of "ON" condition (closed circuit) (˚C) | Temperature of "OFF" condition (open circuit) (˚C) | Indication ofohmmeter (When room temperature is approx. 20˚C) |
|---|---|---|---|
| Temp. fuse 150˚C | This is not resetable type. | Above 150 ˚C | Closed circuit |
| Thermal cut-out 150˚C | Below 130˚C | Above 150˚C | Closed circuit. |
| Thermal cut-out 95˚C | Below 75˚C | Above 95˚C | Closed circuit. |

If incorrect readings are obtained, replace the temp. fuse or thermal cut-out.;

An open circuit temperature fuse 150˚C (MG) indicates that the magnetron has overheated, this may be due to resistricted ventilation, cooling fan failure or a fault condition within the magnetron or HV circuit.

An open circuit thermal cut-out 150˚C (OVEN) indicates that the convection motor has over heated, this may be due to convection motor locked.

An open circuit thermal cut-out 95˚C (FM) indicates that the fan motor winding has overheated, this may be due to blocked ventilation or locked cooling fan.

### H CONVECTION HEATER TEST

CARRY OUT 3D CHECKS.

Before carring out the following tests make sure the heater is fully cool.

1. Resistance of heater
   Disconnect the wire leads to the heater to be tested. Using ohmmeter with low resistance range. Check the resistance across the terminals of the heater.
   The resistance of heater is approximately 37.5 ohms.
2. Insulation resistance
   Disconnect the wire leads to the heater to be tested. Check the insulation resistance between the element and cavity using a 500V - 100Mohms insulation tester. The insulation resistance should be more than 10Mohms in the cold start.

If the results of above test 1 and/or 2 are out of above specifications, the heater is probably faulty and should be replaced.

CARRY OUT 4R CHECKS.

### I THERMISTOR TEST

CARRY OUT 3D CHECKS.

Disconnect connector-E from the CPU unit. Measure the resistance of the thermistor with an ohmmeter. Connect the ohmmeter leads to Pin No's E-3 and E-4 of the thermistor harness.

Room Temp. ..... 20˚C - 30˚C
Resistance ..... Approx. 350kΩ - 155kΩ

If the meter does not indicate above resistance, replace the thermistor.

CARRY OUT 4R CHECKS.

### J MOTOR WINDING TEST

CARRY OUT 3D CHECKS.
Disconnect the leads from the motor.
Using an ohmmeter, check the resistance between the two terminals as described in the table below.

Table: Resistance of Motor

| Motors | Resistance |
|---|---|
| Fan motor | Approximately 295 Ω |
| Turntable motor | Approximately 10.5 kΩ |
| Convection fan motor | Approximately 210 Ω |
| Damper motor | Approximately 11 kΩ |

**TEST PROCEDURES**

| PROCEDURE LETTER | COMPONENT TEST |
|---|---|

If incorrect readings are obtained, replace the motor.

CARRY OUT 4R CHECKS.

**K** **MONITOR RESISTOR TEST**

CARRY OUT 3D CHECKS.

Disconnect the leads from the monitor resist. Using an ohmmeter and set on a low range. Check between the terminals of the monitor resistor.

The resistance of monitor resistor is approx. 0.8 ohms.

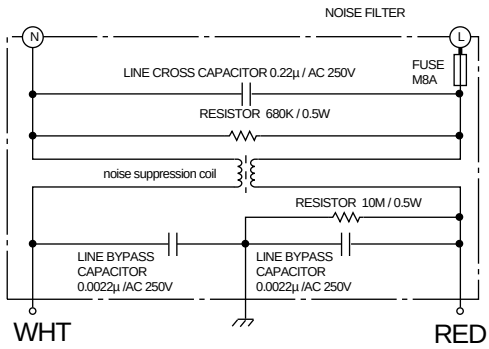
If incorrect readings are obtained, replace the monitor resistor.

CARRY OUT 4R CHECKS.

**L** **NOISE FILTER TEST.**

CARRY OUT 3D CHECKS.

Disconnect the leads from the terminals of the noise filter. Using an ohmmeter, check between the terminals as described in the following table.
If incorrect readings are obtained, replace the noise filter unit.




| MEASURING POINT | INDICATION OF OHMMETER |
|---|---|
| Between N and L | Approx. 680 kΩ |
| Between terminal N and WHITE | Short circuit |
| Between terminal L and RED | Short circuit |

CARRY OUT 4R CHECKS.

**M** **TOUCH CONTROL PANEL ASSEMBLY TEST**

The touch control panel consists of circuits including semiconductors such as LSI, ICs, etc. Therefore, unlike conventional microwave ovens, proper maintenance cannot be performed with only a voltmeter and ohmmeter. In this service manual, the touch control panel assembly is divided into two units, Control Unit and Key Unit and troubleshooting by unit replacement is described according to the symptoms indicated.

1. Key Unit. Note: Check key unit ribbon connection before replacement.
   The following symptoms indicate a defective key unit. Replace the key unit.
   a) When touching the pads, a certain pad produces no signal at all.
   b) When touching a number pad, two figures or more are displayed.
   c) When touching the pads, sometimes a pad produces no signal.
2. Control Unit.
   The following symptoms indicate a defective control unit. Replacethe control unit.

2-1 In connection with pads.
   a) When touching the pads, a certain group of pads do not produce a signal.
   b) When touching the pads, no pads produce a signal.

2-2 In connection with indicators.
   a) At a certain digit, all or some segments do not light up.
   b) At a certain digit, brightness is low.
   c) Only one indicator does not light.
   d) The corresponding segments of all digits do not light up; or they continue to light up.
   e) Wrong figure appears.
   f) A certain group of indicators do not light up.
   g) The figure of all digits flicker.

**TEST PROCEDURES**

| PROCEDURE LETTER | COMPONENT TEST |
|---|---|

2-3 Other possible troubles caused by defective control unit.
a) Buzzer does not sound or continues to sound.
b) Clock does not operate properly.
c) Cooking is not possible.
d) Proper temperature measurement is not obtained.

**N** **KEY UNIT TEST**

If the display fails to clear when the STOP/CLEAR pad is depressed, first verify the flat ribbon is making good contact, verify that the door sensing switch (stop switch) operates properly; that is the contacts are closed when the door is closed and open when the door is open.Å@If the door sensing switch (stop switch) is good, disconnect the flat ribbon that connects the key unit to the control unit and make sure the door sensing switch is closed (either close the door or short the door sensing switch connector). Use the key unit matrix indicated on the control panel schematic and place a jumper wire between the pins that correspond to the STOP/CLEAR pad making momentary contact. If the control unit responds by clearing with a beep the key unit is faulty and must be replaced. If the control unit does not respond, it is faulty and must be replaced. If a specific pad does not respond, the above method may be used (after clearing the control unit) to determine if the control unit or key pad is at fault.

| | G 5 | G 6 | G 7 | G 8 | G 9 | G10 | G11 | G12 |
|---|---|---|---|---|---|---|---|---|
| G 4 | STOP / CLEAR | Reheat Pie | LOW MIX | CLOCK | Casseroles | Jacket Potato | INSTANT COOK / START | MEMORY |
| G 3 | Frozen Vegetables | Fresh Vegetables | CONVEC | HIGH MIX | EASY DEFROST | Desserts | GRILL | ▲ MORE |
| G 2 | MULTI COOK | HELP | 6 180˚C | 7 200˚C | 8 220˚C | 9 230˚C | 0 250˚C | POWER LEVEL |
| G 1 | REHEAT SENSOR | ▼ LESS | 1 40˚C | 2 70˚C | 3 130˚C | 4 150˚C | 5 160˚C | REHEAT |

**O** **RELAY TEST**

Remove the outer case and check voltage between Pin No 9 of the 5-pin connector (A) and the common terminal of the relay RY1 on the control unit with an A.C. voltmeter. The meter should indicate 230 - 240 volts, if not check oven circuit.

Shut-off, Cook and Heater Relay Test
These relays are operated by D.C. voltage.
Check voltage at the relay coil with a D.C. voltmeter during the microwave cooking operation or convection cooking operation.
DC. voltage indicated ..... Defective relay.
DC. voltage not indicated ..... Check diode which is connected to the relay coil. If diode is good, control unit is defective.

| RELAY SYMBOL | OPERATIONAL VOLTAGE | CONNECTED COMPONENTS |
|---|---|---|
| RY1 | APPROX. 21.0V D.C. | Oven lamp / Turntable motor |
| RY2(COOK) | APPROX. 21.0V D.C. | Power transformer |
| RY3(HEATER) | APPROX. 20.0V D.C. | Heating element |
| RY4 | APPROX. 21.0V D.C. | Damper motor |
| RY5 | APPROX. 21.0V D.C. | Convection motor |
| RY6 | APPROX. 21.0V D.C. | Cooling fan motor |

**P** **PROCEDURES TO BE TAKEN WHEN THE FOIL PATTERN ON THE PRINTED WIRING BOARD (PWB) IS OPEN**

To protect the electronic circuits, this model is provided with a fine foil pattern added to the primary on the PWB, this foil pattern acts as a fuse. If the foil pattern is open, follow the troubleshooting guide given below for repair.

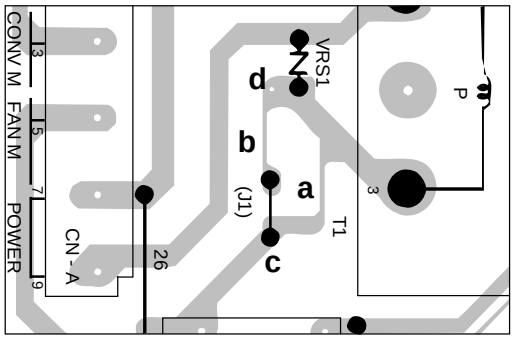
Problem: POWER ON, indicator does not light up.

## TEST PROCEDURES

| PROCEDURE LETTER | COMPONENT TEST |
|---|---|

| STEPS | OCCURRENCE | CAUSE OR CORRECTION |
|---|---|---|
| 1 | The rated voltage is not applied between Pin No. 9 of the 5-pin connector (A) and the common terminal of the relay RY1. | Check supply voltage and oven power cord. |
| 2 | The rated voltage is applied to primary side of power transformer. | Power transformer or secondary circuit defective. Check and repair. |
| 3 | Only pattern at "a" is broken. | *Insert jumper wire J1 and solder. |
| 4 | Pattern at "a" and "b" are broken. | *Insert the coil RCILF2003YAZZ between "c" and "d". |

NOTE: *At the time of making these repairs, make a visual inspection of the varistor. check for burned damage and examine the transformer with an ohmmeter for the presence of layer short-circuit (check primary coil resistance). If any abnormal condition is detected, replace the defective parts.




**Q** **AH SENSOR TEST**

**Checking the initial sensor cooking condition**

(1) The oven should be plugged in at least five minutes before sensor cooking.
(2) Room temperature should not exceed 35˚C.
(3) The unit should not be installed in any area where heat and steam are generated. The unit should not be installed, for example, next to a conventional surface unit. Refer to the "INSTALLATION Instructions" .
(4) Exhaust vents are provided on the back of the unit for proper cooling and air flow in the cavity. To permit adequate ventilation, be sure to install so as not to block these vents. There should be some space for air circulation.
(5) Be sure the exterior of the cooking container and the interior of the oven are dry. Wipe off any moisture with a dry cloth or paper towel.
(6) The Sensor works with food at normal storage temperature.For example, chicken pieces would be at refrigerator temperature and canned soup at room temperature.
(7) Avoid using aerosol sprays or cleaning solvents near the oven while using Sensor settings. The sensor will detect the vapor given of by the spray and turn off before food is properly cooked.
(8) After the oven is started on sensor cooking condition, if the sensor has not detected the vapor of the food, ERROR will appear and the oven will shut off.

**Water load cooking test**

Make sure the oven has been plugged in at least five minutes before checking sensor cook operation. The cabinet should be installed and screws tightened.
(1) Fill approximately 200 milliliters (7.2 oz) of tap water in a 1000 milliliter measuring cup.
(2) Place the container on the center of tray in the oven cavity.
(3) Close the door.
(4) Touch REHEAT SENSOR pad twice and touch INSTANT COOK/START pad.Now, the oven is in the sensor cooking condition and "BEVE-", "RAGE", "SOUP", "SENSOR" and "REHEAT" will appear in the display.
(5) The oven will operate for the first 16 seconds, without generating microwave energy.

When the AH sensor is defective (open or short), ERROR will appear in the display after 16 seconds cleaning time.
If ERROR appears check sensor wire connections and/or AH sensor.
NOTE: ERROR will appear if the door is opend or STOP/CLEAR pad is touched during first stage of sensor cooking.
(6) After approximately 16 seconds, microwave energy is produced, and the display should start to count down the remaining cooking time and oven should turn off when water is boiling (bubling).
If the oven does not turn off, replace the AH sensor or check the control unit, refer to explanation below.

**TEST PROCEDURES**

| PROCEDURE LETTER | COMPONENT TEST |
|---|---|

## TESTING METHOD FOR AH SENSOR AND/OR CONTROL UNIT

To determine if the sensor is defective, the simplest method is to replace it with a new replacement sensor.

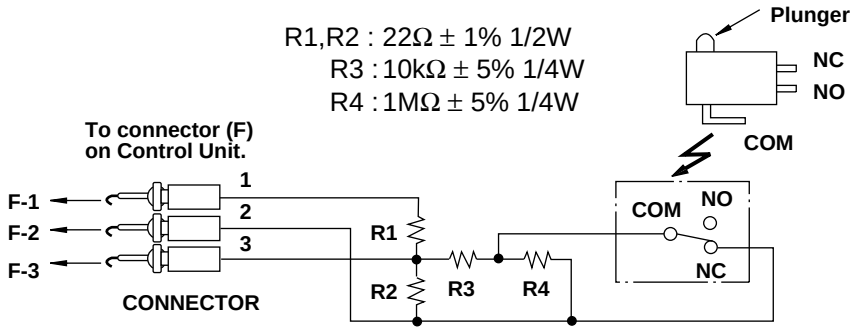
(1) Disconnect oven from power supply and remove outer case.
(2) Discharge the high voltage capacitor.
(3) Remove the AH sensor.
(4) Install the new AH sensor.
(5) Re-install the outer case.
(6) Reconnect the oven to the power supply and check the sensor cook operation, proceed as follows:
  6-1. Fill approximately 200 milliliters (7.2 oz) of tap water in a 1000 milliliter measuring cup.
  6-2. Place the container on the center of tray in the oven cavity.
  6-3. Close the door.
  6-4. Touch REHEAT SENSOR pad twice and touch the INSTANT COOK/START pad.
  6-5. The control panel is in automatic Sensor operation.
  6-6. The display will start to count down the remaining cooking time, and the oven will turn off automatically when the water is boiling (bubling).

If new sensor dose not operate properly, the problem is with the control unit.

## CHECKING CONTROL UNIT

(1) Disconnect oven from power supply and remove outer case.
(2) Discharge the high voltage capacitor.
(3) Disconnect the wire leads from the cook relay.
(4) Disconnect the sensor connector that is mounted to lower portion of control panel.
(5) Then connect the dummy resistor circuit (see fig.) to the sensor connector of control panel.
(6) Reconnect the oven to the power supply and check the sensor cook operation, proceed as follows:
  6-1. Touch REHEAT SENSOR pad twice and touch the INSTANT COOK/START pad.
  6-2. The control panel is in the sensor cooking operation.
  6-3. After approximately 20 seconds, push plunger of select switch. This condition is same as judgement by AH sensor.
  6-4. After approximately 3 seconds, cooking operation turns off, an audible signal will sound.

If the above is not the case, the control unit is probably defective.
If the above is proper, the AH sensor is probably defective.




**Sensor Dummy Resistor Circuit**

# TOUCH CONTROL PANEL ASSEMBLY

OUTLINE OF TOUCH CONTROL PANEL

The touch control section consists of the following units as shown in the touch control panel circuit.

(1) Key Unit
(2) Control Unit

The principal functions of these units and the signals communicated among them are explained below.

**Key Unit**
The key unit is composed of a matrix, signals generated in the LSI are sent to the key unit through P10-P17.
When a key pad is touched, a signal is completed through the key unit and passed back to the LSI through R24-R27 to perform the function that was requested.

**Control Unit**
Control unit consists of LSI, power source circuit, synchronizing signal circuit, ACL circuit, buzzer circuit, temperature measurement circuit, absolute humidity sensor circuit and indicator circuit.

**1) LSI**
This LSI controls the temperature measurement signal, AH sensor signal, key strobe signal, relay driving signal for oven function and indicator signal.

**2) Power Source Circuit**
This circuit generates the voltages necessary for the control unit from the AC line voltage.

**3) Synchronizing Signal Circuit**
The power source synchronizing signal is available in order to compose a basic standard time in the clock circuit. It incorporates a very small error because it works on commercial frequency.

**4) ACL Circuit**
A circuit to generate a signals which resetting the LSI to the initial state when power is applied.

**5) Buzzer Circuit**
The buzzer is responds to signals from the LSI to emit noticing sounds (key touch sound and completion sound).

**6) Temperature Measurement Circuit : (OVEN THERMISTOR)**
The temperature in the oven cavity is sensed by the thermistor. The variation of resistance according to sensed temperature is detected by the temperature measurement circuit and the result applied to LSI. The LSI uses this information to control the relay and display units.

**7) Absolute Humidity Sensor Circuit**
This circuit detects the humidity of a food which is being cooked, to control its automatic cooking.

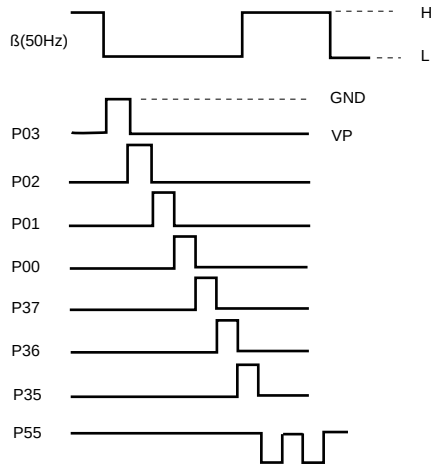
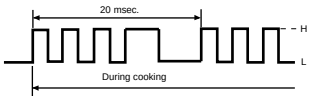
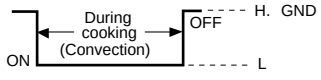
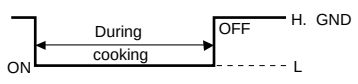
**8) Door Sensing Switch**
A switch to inform the LSI if the door is open or closed.

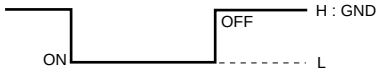
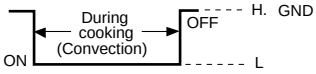
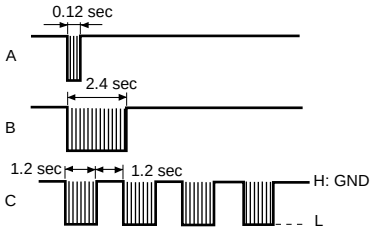
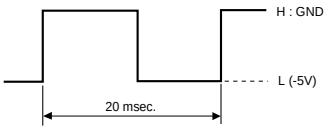
**9) Relay Circuit**
To drive the magnetron, heating element, fan motor, convection motor, damper motor, turntable motor and light the oven lamp.

**10) Indicator Circuit**
Indicator element is a Fluorescent Display.
Basically, a Fluorescent Display is triode having a cathode, a grid and an anode. Usually, the cathode of a Fluorescent Display is directly heated and the filament serves as cathode.
The Fluorescent Display has 8-digits, 16-segments are used for displaying figures.

# DESCRIPTION OF LSI

**LSI(IZA736DR):**
The I/O signals of the LSI(IZA736DR) are detailed in the following table.

| Pin No. | Signal | I/O | Description |
|---|---|---|---|
| 1 | VCC | IN | Connected to GND. |
| 2 | VEE | IN | **Anode (segment) of Fluorescent Display light-up voltage: -30V.**<br>Vp voltage of power source circuit input. |
| 3 | AVSS | IN | **Power source voltage: -5V.**<br>VC voltage of power source circuit input. |
| 4 | VREF | IN | **Reference voltage input terminal.**<br>A reference voltage applied to the A/D converter in the LSI. Connected to GND.(0V) |
| 5 | AN7 | IN | Used for initial balancing of the bridge circuit (absolute humidity sensor). This input is an analog input terminal from the AH sensor circuit, and connected to the A/D coverter built into the LSI. |
| 6 | AN6 | IN | **AH sensor input.**<br>This input is an analog input terminal from the AH sensor circuit, and connected to the A/D converter built into the LSI. |
| 7-9 | AN5-AN3 | IN | **Heating constant compensation terminal.** |
| 10 | AN2 | IN | **Input signal which communicates the door open/close information to LSI.**<br>Door closed; "H" level signal(0V).<br>Door opened; "L" level signal(-5V). |
| 11 | AN1 | IN | **Input signal which communicates the damper open/close information to LSI.**<br>Damper opened; "H" level signal(0V:GND).<br>Damper closed; "L" level signal(-5V). |
| 12 | AN0 | IN | **Temperature measurement input: OVEN THERMISTOR.**<br>By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI. |
| 13 | P55 | OUT | **Digit selection signal.**<br>The relationship between digit signal and digit are as follows;<br>Digit signal — Digit<br>P03 ..... 1st.<br>P02 ..... 2nd.<br>P01 ..... 3rd.<br>P00 ..... 4th.<br>P37 ..... 5th.<br>P36 ..... 6th.<br>P35 ..... 7th.<br>P55 ..... 8th.<br>Normally, one pulse is output in every ß period, and input to the grid of the Fluorescent Display.<br>  |
| 14 | P54 | OUT | **Oven lamp and turntable motor driving signal. (Square Waveform : 50Hz)**<br>To turn on and off the shut-off relay(RY1). The square waveform voltage is delivered to the relay(RY1) driving circuit.<br>  |
| 15 | P53 | OUT | **Convection motor driving signal.**<br>To turn on and off shut-off relay(RY5). "L" level during CONVECTION; "H" level otherwise.<br>  |
| 16 | P52 | OUT | **Cooling fan motor driving signal.**<br>To turn on and off shut-off relay(RY6). "L" level during both microwave and convection cooking; "H" level otherwise.<br>  |

| Pin No. | Signal | I/O | Description |
|---|---|---|---|
| 17 | P51 | OUT | **Magnetron high-voltage circuit driving signal.**<br>To turn on and off the cook relay(RY2). In HIGH operation, the signals holds "L" level during microwave cooking and "H" level while not cooking. In other cooking modes (MED HIGH, MED, MED LOW, LOW) the signal turns to "H" level and "L" level in repetition according to the power level.<br>VARI MODE / ON TIME / OFF TIME:<br>HIGH (100% power) 32 sec. 0 sec.<br>MED HIGH (approx. 70% power) 24 sec. 8 sec.<br>MED (approx. 50% power) 18 sec. 14 sec.<br>MED LOW (approx. 30% power) 12 sec. 20 sec.<br>LOW (approx. 10% power) 6 sec. 26 sec. |
| 18 | P50 | OUT | **Damper motor relay driving signal.**<br>To turn on and off shut-off relay(RY4).<br>  |
| 19 | P47 | OUT | **Heating element driving signal.**<br>To turn on and off shut-off relay(RY3). "L" level during convection cooking; "H" level otherwise. During convection cooking, the signal becomes "H" level when the temperature of the oven cavity exceeds the predetermined temperature.<br>  |
| 20-21 | P46-P45 | OUT | Terminal not used. |
| 22 | P44 | OUT | **Timing signal output terminal for temperature measurement(OVEN THERMISTOR).**<br>"H" level (GND) : Ttermistor OPEN timing.<br>"L" level (-5V) : Temperature measuring timing.(Convection cooking) |
| 23 | P43 | OUT | **Signal to sound buzzer.**<br>A: key touch sound.<br>B: Completion sound.<br>C: When the temperature of the oven cavity reaches the preset temperature in the preheating mode, or when the preheating hold time (30 minutes) is elapsed.<br>  |
| 24 | P42 | OUT | **Timing signal output terminal for temperature measurement(OVEN).**<br>"H" level (GND) : Ttermistor OPEN timing.<br>"L" level (-5V) : Temperature measuring timing.(Convection cooking) |
| 25 | INT1 | IN | **Signal to synchronize LSI with commercial power source freqency.**<br>This is the basic timing for all real time processing of LSI.<br>  |
| 26 | P40 | IN | Connected to GND. |
| 27 | RST | IN | **Auto clear terminal.**<br>Signal is input to reset the LSI to the initial state when power is applied. Temporarily set to "L" level the moment power is applied, at this time the LSI is reset. Thereafter set at "H" level. |
| 28/29 | XCIN/XCOUT | OUT | Terminal not used. |
| 30 | XIN | IN | **Internal clock oscillation frequency setting input.**<br>The internal clock frequency is set by inserting the ceramic filter oscillation circuit with respect to XOUT terminal. |
| 31 | XOUT | OUT | **Internal clock oscillation frequency control output.**<br>Output to control oscillation input of XIN. |
| 32 | VSS | IN | **Power source voltage: -5V.**<br>VC voltage of power source circuit input. |
| 33 | P27 | IN | **Signal coming from touch key.**<br>When any one of G-1 line keys on key matrix is touched, a corresponding signal from P17 - P17 will be input into P27. When no key is touched, the signal is held at "L" level. |
| 34 | P26 | IN | **Signal similar to P27.**<br>When any one of G-2 line key on key matrix is touched, a corresponding signal will be input into P26. |

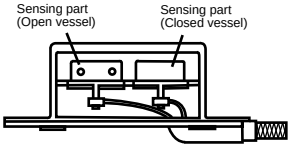
| Pin No. | Signal | I/O | Description |
|---|---|---|---|
| 35 | P25 | IN | **Signal similar to P27.**<br>When any one of G-3 line key on key matrix is touched, a corresponding signal will be input into P25. |
| 36 | P24 | IN | **Signal similar to P27.**<br>When any one of G-4 line key on key matrix is touched, a corresponding signal will be input into P24. |
| 37 | P23 | OUT | **Segment data signals.**<br>The relation between signals and indicators are as follows:<br>Signal Segment / Signal Segment / Signal Segment / Signal Segment<br>P23 ..... P1 / P17 ..... P5 / P13 ..... P9 / P07 ..... P13<br>P22 ..... P2 / P16 ..... P6 / P12 ..... P10 / P06 ..... P14<br>P21 ..... P3 / P15 ..... P7 / P11 ..... P11 / P05 ..... P15<br>P20 ..... P4 / P14 ..... P8 / P10 ..... P12 / P04 ..... P16 |
| 38-40 | P22-P20 | OUT | **Segment data signal.**<br>Signal similar to P23. |
| 41 | P17 | OUT | **Segment data signal.**<br>Signal similar to P23.<br>**Key strobe signal.**<br>Signal applied to touch-key section. A pulse signal is input to P24-P27 terminal while one of G-12 line keys on key matrix is touched. |
| 42 | P16 | OUT | **Segment data signal.**<br>Signal similar to P23.<br>**Key strobe signal.**<br>Signal applied to touch-key section. A pulse signal is input to P24-P27 terminal while one of G-11 line keys on key matrix is touched. |
| 43 | P15 | OUT | **Segment data signal.**<br>Signal similar to P23.<br>**Key strobe signal.**<br>Signal applied to touch-key section. A pulse signal is input to P24-P27 terminal while one of G-10 line keys on key matrix is touched. |
| 44 | P14 | OUT | **Segment data signal.**<br>Signal similar to P23.<br>**Key strobe signal.**<br>Signal applied to touch-key section. A pulse signal is input to P24-P27 terminal while one of G-9 line keys on key matrix is touched. |
| 45 | P13 | OUT | **Segment data signal.**<br>Signal similar to P23.<br>**Key strobe signal.**<br>Signal applied to touch-key section. A pulse signal is input to P24-P27 terminal while one of G-8 line keys on key matrix is touched. |
| 46 | P12 | OUT | **Segment data signal.**<br>Signal similar to P23.<br>**Key strobe signal.**<br>Signal applied to touch-key section. A pulse signal is input to P24-P27 terminal while one of G-7 line keys on key matrix is touched. |
| 47 | P11 | OUT | **Segment data signal.**<br>Signal similar to P23.<br>**Key strobe signal.**<br>Signal applied to touch-key section. A pulse signal is input to P24-P27 terminal while one of G-6 line keys on key matrix is touched. |
| 48 | P10 | OUT | **Segment data signal.**<br>Signal similar to P23.<br>**Key strobe signal.**<br>Signal applied to touch-key section. A pulse signal is input to P24-P27 terminal while one of G-5 line keys on key matrix is touched. |
| 49-53 | P07-P03 | OUT | **Segment data signal.**<br>Signal similar to P23. |

| Pin No. | Signal | I/O | Description |
|---|---|---|---|
| 54-56 | P02-P00 | OUT | **Digit selection signal.**<br>Signal similar to P55. |
| 57-59 | P37-P35 | OUT | **Digit selection signal.**<br>Signal similar to P55. |
| 60-64 | P34-P30 | OUT | Used for initial balancing of the bridge circuit (absolute humidity sensor). |

## ABSOLUTE HUMIDITY SENSOR CIRCUIT

**(1) Structure of Absolute Humidity Sensor**

The absolute humidity sensor includes two thermistors as shown in the illustration. One thermistor is housed in the closed vessel filled with dry air while another in the open vessel. Each sensor is provided with the protective cover made of metal mesh to be protected from the external airflow.

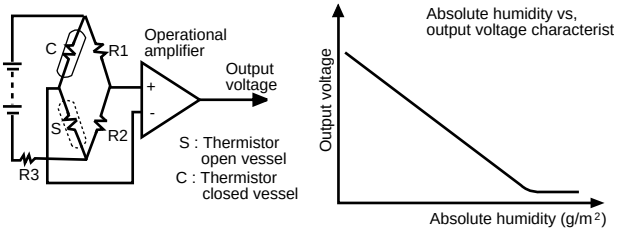



**(2) Operational Principle of Absolute Humidity Sensor**

The figure below shows the basic structure of an absolute humidity sensor. A bridge circuit is formed by two thermistors and two resistors (R1 and R2).

The output of the bridge circuit is to be amplified by the operational amplifier.

Each thermistor is supplied with a current to keep it heated at about 150˚C (302˚F), the resultant heat is dissipated in the air and if the two thermistors are placed in different humidity conditions they show different degrees of heat conductivity leading to a potential difference between them causing an output voltage from the bridge circuit, the intensity of which is increased as the absolute humidity of the air increases. Since the output is very minute, it is amplified by the operational amplifier.




**(3) Detector Circuit of Absolute Humidity Sensor Circuit**

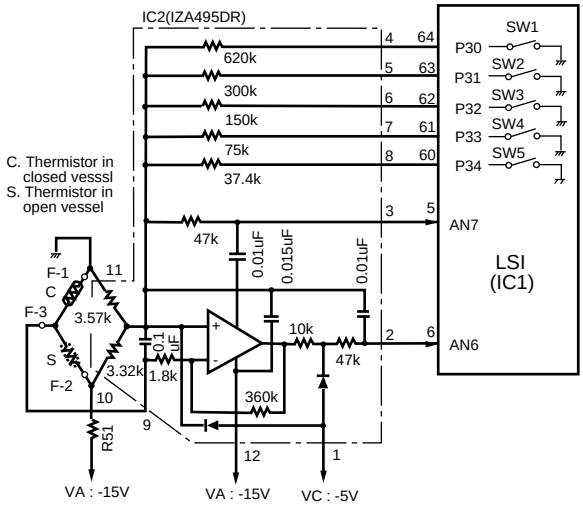
This detector circuit is used to detect the output voltage of the absolute humidity circuit to allow the LSI to control sensor cooking of the unit. When the unit is set in the sensor cooking mode, 16 seconds clearing cycle occurs than the detector circuit starts to function and the LSI observes the initial voltage available at its AN6 terminal.

With this voltage given, the switches SW1 to SW5 in the LSI are turned on in such a way as to change the resistance values in parallel with R50-1. Changing the resistance values results in that there is the same potential at both F-3 terminal of the absolute humidity sensor and AN7 terminal of the LSI. The voltage of AN6 terminal will indicate about -2.5V. This initial balancing is set up about 16 seconds after the unit is put in the Sensor Cooking mode. As the sensor cooking proceeds, the food is heated to generate moisture by which the resistance balance of the bridge circuit is deviated to increase the voltage available at AN6 terminal of the LSI.

Then the LSI observes that voltage at AN6 terminal and compares it with its initial value, and when the comparison rate reaches the preset value (fixed for each menu to be cooked), the LSI causes the unit to stop sensor cooking; thereafter, the unit goes in the next operation automatically.

When the LSI starts to detect the initial voltage at AN6 terminal 16 seconds after the unit has been put in the Sensor Cooking mode, if it is not possible to balance, of the bridge circuit due to disconnection of the absolute humidity sensor, ERROR will appear on the display and the cooking is stopped.

1) Absolute humidity sensor circuit



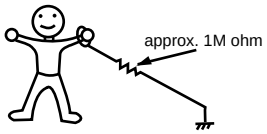
# SERVICING

**1. Precautions for Handling Electronic Components**

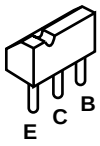
This unit uses CMOS LSI in the integral part of the circuits. When handling these parts, the following precautions should be strictly followed. CMOS LSI have extremely high impedance at its input and output terminals. For this reason, it is easily influenced by the surrounding high voltage power source, static electricity charge in clothes, etc, and sometimes it is not fully protected by the built-in protection circuit.

In order to protect CMOS LSI.

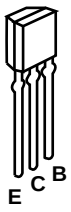
1) When storing and transporting, thoroughly wrap them in aluminium foil. Also wrap all PW boards containing them in aluminium foil.
2) When soldering, ground the technician as shown in the figure and use grounded soldering iron and work table.




**2. Shapes of Electronic Components**




Transistor
2SB910M




Transistor
DTA123ES
KRA101M
KRA223M
KRC243M

**3. Servicing of Touch Control Panel**

We describe the procedures to permit servicing of the touch control panel of the microwave oven and the precautions you must take when doing so. To perform the servicing, power to the touch control panel is available either from the power line of the oven itself or from an external power source.

**(1) Servicing the touch control panel with power supply of the oven:**

**CAUTION:**

**THE HIGH VOLTAGE TRANSFORMER OF THE MICROWAVE OVEN IS STILL LIVE DURING SERVICING PRESENTS A HAZARD.**

Therefore, when checking the performance of the touch control panel, put the outer cabinet on the oven to avoid touching the high voltage transformer, or unplug the primary terminal (connector) of the high voltage transformer to turn it off; the end of such connector must be insulated with an insulating tape. After servicing, be sure to replace the leads to their original locations.

**A.** On some models, the power supply cord between the touch control panel and the oven itself is so short that the two can't be separated.

For those models, check and repair all the controls (sensor-related ones included) of the touch control panel while keeping it connected to the oven.

**B.** On some models, the power supply cord between the touch control panel and the oven proper is long enough that they may be separated from each other. For those models, therefore, it is possible to check and repair the controls of the touch control panel while keeping it apart from the oven proper; in this case you must short both ends of the door sensing switch (on PWB) of the touch control panel with a jumper, which brings about an operational state that is equivalent to the oven door being closed. As for the sensor-related controls of the touch control panel, checking them is possible if dummy resistor(s) with resistance equal to that of the controls are used.

**(2) Servicing the touch control panel with power supply from an external power source:**

Disconnect the touch control panel completely from the oven proper,and short both ends of the door sensing switch (on PWB) of the touch control panel,which brings about an operational state that is equivalent to the oven door being closed. Connect an external power source to the power input terminal of the touch control panel, then it is possible to check and repair the controls of the touch control panel it is also possible to check the sensor-related controls of the touch control panel by using the dummy resistor(s).

**4. Servicing Tools**

Tools required to service the touch control panel assembly.

1) Soldering iron: 30W
   (It is recommended to use a soldering iron with a grounding terminal.)
2) Oscilloscope: Single beam, frequency range: DC - 10MHz type or more advanced model.
3) Others: Hand tools

**5. Other Precautions**

1) Before turning on the power source of the control unit, remove the aluminum foil applied for preventing static electricity.
2) Connect the connector of the key unit to the control unit being sure that the lead wires are not twisted.
3) After aluminum foil is removed, be careful that abnormal voltage due to static electricity etc. is not applied to the input or output terminals.
4) Attach connectors, electrolytic capacitors, etc. to PWB, making sure that all connections are tight.
5) Be sure to use specified components where high precision is required.

# COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE

**WARNING: Avoid possible exposure to microwave energy. Please follow the instructions below before operating the oven.**

1. Disconnect the oven from power supply.
2. Make sure that a definite" click" can be heard when the microwave oven door is unlatched. (Hold the door in a closed position with one hand, then push the door open button with the other, this causes the latch leads to rise, it is then possible to hear a "click' as the door switches operate.)
3. Visually check the door and cavity face plate for damage (dents, cracks, signs of arcing etc.).

Carry out any remedial work that is necessary before operating the oven.
Do not operate the oven if any of the following conditions exist;

1. Door does not close firmly.
2. Door hinge, support or latch hook is damaged.
3. The door gasket or seal or damaged.
4. The door is bent or warped.
5. There are defective parts in the door interlock system.
6. There are defective parts in the microwave generating and transmission assembly.
7. There is visible damage to the oven.

Do not operate the oven:
1. Without the RF gasket (Magnetron).
2. If the wave guide or oven cavity are not intact.
3. If the door is not closed.
4. If the outer case (cabinet) is not fitted.

Please refer to 'OVEN PARTS, CABINET PARTS, DOOR PARTS', when carrying out any of the following removal procedures:

## OUTER CASE REMOVAL

To remove the outer case, proceed as follows.
1. Disconnect the oven from power supply.
2. Open the oven door and wedge it open.
3. Remove the screws from rear and along the side edge of case.
4. Slide the entire case back about 1 inch (3cm) to free it from retaining clips on the cavity face plate.
5. Lift the entire case from the oven.
6. Discharge the H.V. capacitor before carring out any further work.
7. Do not operate the oven with the outer case removed.

N.B.; Step1, 2 and 6 from the basis of the 3D checks.

CAUTION: DISCHARGE HIGH VOLTAGE CAPACITOR BEFORE TOUCHING ANY OVEN COMPONENTS OR WIRING.

## POWER TRANSFORMER REPLACEMENT

**REMOVAL**
1. CARRY OUT 3D CHECKS.
2. Disconnect the wire leads from power transformer.
3. Disconnect the filament leads of the power transformer from the megnetron and high voltage capacitor.
4. Disconnect the high voltage leads of capacitor from the transformer.
5. Remove the two (2) screws and one (1) washer holding the transformer to the base cabinet.
6. Remove the transformer.

**RE-INSTALL**
1. Rest the transformer on the base cabinet with its primary terminals toward rear cabinet.
2. Insert the two edges of the transformer into two metal tabs of the base cabinet.
3. Make sure the transformer is mounted correctly to the corners underneath those tabs.
4. After re-installing the transformer, secure the transformer with two screws to the bace cabint, one is with outertooth washer and the other is without outertooth washer.
5. Re-connect the wire leads (primary and high voltage) and high voltage lead to the transformer and filament leads of transformer to the magnetron and capacitor, referring to the "Pictorial Diagram".
6. Re-install the outer case and check that the oven is operating properly.

NOTE: LIVE(ORANGE) WIRE MUST BE CONNECTED TO THE CABINET-SIDE OF THE POWER TRANSFORMER.

## MAGNETRON REMOVAL

1. CARRY OUT 3D CHECKS
2. Disconnect filament lead of transfomer and high voltage wire lead from magnetron.
3. Take off three (3) screws secured the chassis support to oven cavity and waveguide.
4. Remove the cooling fan assembly refer to "Cooling Fan Removal"
5. Carefully remove four (4) mounting screws holding the magnetron and magnetron air guide to waveguide. When removing the screws hold the magnetron and magnetron air guide to prevent it from falling.
6. Remove the magnetron from the waveguide with care so the magnetron antenna should not hit by any metal object around the antenna

CAUTION: WHEN REPLACING THE MAGNETRON, BE SURE THE R.F. GASKET IS IN PLACE AND THE MAGNETRON MOUNTING SCREWS ARE TIGHTENED SECURELY.

## ASYMMETRIC RECTIFIER AND HIGH VOLTAGE RECTIFIER REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove one (1) screw holding the high voltage rectifier terminal to the capacitor holder.
3. Disconnect the high voltage rectifier assembly from the capacitor.

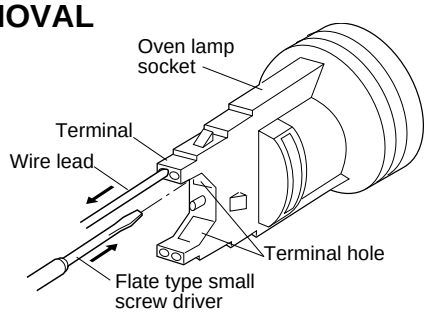
CAUTION: WHEN REPLACING HIGH VOLTAGE RECTIFIER ASSEMBLY, ENSURE THAT THE EARTHING SIDE TERMINAL MUST BE SECURED FIRMLY WITH AN EARTHING SCREW.

## HIGH VOLTAGE CAPACITOR REMOVAL

1. CARRY OUT 3D CHECKS.
2. Disconnect the high voltage wire leads and rectifier assembly from the high voltage capacitor and magnetron.
3. Disconnect filament lead of transfomer from high voltage capacitor.
4. Disconnect high voltage wire leads of capacitor from transformer.
5. Remove one (1) screw and washer holding the high voltage rectifier from the capacitor holder.
6. Remove one (1) screw holding capacitor holder to rear cabinet.
7. Remove the high voltage capacitor from the holder.

## OVEN LAMP SOCKET REMOVAL

1. CARRY OUT 3D CHECKS.
2. Pull the wire leads from the oven lamp socketby pushing the terminal hole of the oven lamp socket withthe flat type small screw driver.
3. Lift up the tab of oven lamp mounting plate holding the oven lamp socket.
4. Slide the oven lamp socket left-ward.
5. Now, the oven lamp socket is free.




## HEATER UNIT ASSEMBLY REMOVAL (HEATING ELEMENT/THERMISTOR)

1. CARRY OUT 3D CHECKS.
2. Disconnect wire leads from oven thermal cut-out, convection motor, thermistor and heater element. Remove convection motor ass'y refer to "Convection Motor Removal No.3 to No.5".
3. Remove eleven (11) screws holding heater duct to the oven cavity.
4. Release two (2) snap bands holding wire harness to the thermal protection plate (left).
5. The heater unit is now free.

**HEATING ELEMENT AND THERMISTOR**

1. Remove two (2) screws holding heating element to heater duct.
2. Loosen two (2) screws holding holders to heater duct and take heating element out of heating element holders.
3. Heating element is free.
4. Remove two (2) screws holding thermistor to heater duct.
5. Thermistor is free.

## CONTROL PANEL ASSEMBLY AND CONTROL UNIT REMOVAL

To remove the control panel, proceed as follows:

1. CARRY OUT 3D CHECKS
2. Disconnect connector CN-A, CN-E, CN-B, CN-F, TAB1, TAB2 and TAB3 from the control unit.
3 Remove one (1) screw holding the control panel back plate to the chassis support.
4. Remove the one (1) screw holding the bottom edge of the back plate to the cabinet base.
5. Remove two (2) screws holding the back plate to the oven cavity flange.
6. Lift up and pull the control panel forward.

Replacement of individual component is as follows:

**CONTROL UNIT AND KEY UNIT**

1. Disconnect the wire connector from the control unit.
2. Remove the four (4) screws holding the panel frame to the back plate.
3. Separate the panel frame and back plate.
4. Remove the three (3) screws holding the control unit to the panel frame.
5. Lift up the control unit and disconnect the key connector from the control unit.
6. Now, the control unit and frame assembly are separated.

NOTE: 1. Before attaching a new key unit, remove remaining adhesive on the control panel frame surfaces completely with alcohol and so on.
2. When attaching the key unit to the control panel frame, adjust the lower edge and right edge of the key unit to the correct position of control panel frame.
3. Stick the key unit firmly to the control panel frame by rubbing with soft cloth not to scratch.

## TURNTABLE MOTOR AND/OR COUPLING REMOVAL

1. Disconnect the oven from power supply.
2. Remove one (1) screw holding the turntable motor cover to the base cabinet and take off the turntable motor cover.

3. Disconnect wire lead from the turntable motor.
4. Remove the two (2) screws holding the turntable motor to the mounting plate of the oven cavity bottom.
5. Pull the turntable coupling out of the oven cavity.
6. Turntable coupling and motor will be free.

## CONVECTION MOTOR REMOVAL

1. CARRY OUT 3D CHECKS.
2. Disconnect wire leads from the convection motor. Remove the convection fan belt and pulley(M).
3. Remove two (2) screws holding the convection motor mounting angle to the heater duct and base cabinet.
4. Take out the convection motor assembly from the unit. The convection motor assembly is now free.
5. Remove two (2) screws and nuts holding the motor to mounting angle.
6. Convection motor is now free.

## DAMPER ASSEMBLY REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove cooling fan motor and magnetron refer to “Cooling Fan Motor Removal” and “Magnetrom Removal”.
3. Disconnect wire leads from damper motor and damper switch.
4. Remove two(2) ovenside screws holding damper motor angle to thermal protection plate (right).
5. Damper assembly is free.
6. Remove one (1) screw holding damper motor to damper motor angle and one (1) screw holding damper switch to damper motor angle.
7. Damper motor and switch are free.

## FAN MOTOR REPLACEMENT

**REMOVAL**

1. CARRY OUT 3D CHECKS.
2. Disconnect the wire leads from the fan motor and thermal cut-out.
3. Remove the three (3) screws holding the chassis support to rear cabinet, control panel back plate and waveguide.
4 Remove one (1) tab holding the fan duct to air guide .
5. Remove the fan motor assembly from the oven cavity.
6. Remove the fan blade assembly from the fan motor shaft according the following procedure.

1) Hold the edge of the rotor of the fan motor by using a pair of grove joint pliers.

**CAUTION:**

* **Make sure that any pieces do not enter the gap between the rotor and the stator of the fan motor. Because the rotor is easy to be shaven by pliers and metal pieces may be produced.**
* **Do not touch the pliers to the coil of the fan motor because the coil may be cut or injured.**
* **Do not transform the bracket by touching with the pliers.**

2) Remove the fan blade assembly from the shaft of the fan motor by pulling fan retainer clip and rotating the fan blade with your hand.

3) Now, the fan blade will be free.

**CAUTION:**

* **Do not use this removed fan blade again.Because the hole(for shaft) of it may become bigger than a standard one.**

7. Remove the two (2) screws and nuts holding the fan motor and thermal cut-out mounting angle from the fun duct.
8. Now, the fan motor is free.

**INSTALLATION**

1. Install the fan motor and thermal cut-out angle to the fan duct with the two (2) screws and nuts.
2. Install the fan blade assembly to the fan motor shaft according the following procedure.

1) Hold the center of the bracket which supports the shaft of the fan motor on the flat table.

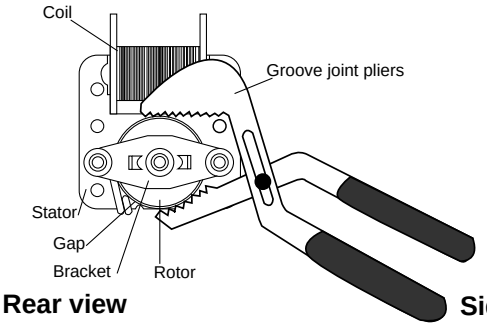
2) Apply the screw lock tight into the hole(for shaft) of the fan blade.

3) Install the fan blade assemby to the shaft of fan motor by pushing the fan blade with a small, light weight, ball peen hammer or rubber mallet.

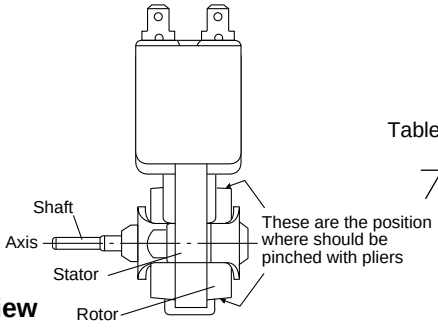
**CAUTION:**

* **Do not hit the fan blade strongly when installed because the bracket may be transformed.**
* **Make sure that the fan blade rotates smooth after installed.**
* **Make sure that the axis of the shaft is not slanted.**

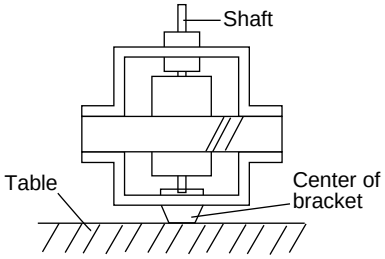
3. Install the fan duct to the air guide.
4. Install the chassis support to the oven cavity with three (3) screws.
5. Connect the wire leads to the fan motor and the thermal cut-out, referring to the pictorial diagram.




**Rear view**



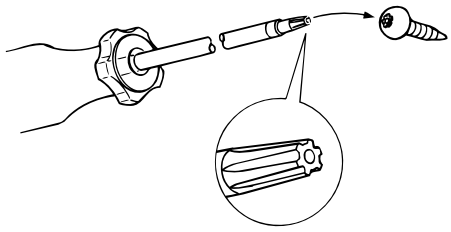

**Side view**



## CORD HOLDER REMOVAL

1. Remove the one (1) special screw holding the cord holder to the rear cabinet, using the special driver LHSTIX DLR4-100T.
2. Now, the cord holder is free.

NOTE: When securing or loosening the special screw, LHSTIX DLR4-100T type screw driver should be used.



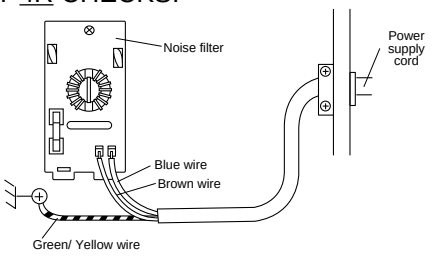
## POWER SUPPLY CORD REPLACEMENT

**Removal**

1. CARRY OUT 3D CHECKS.
2. Disconnect the brown and blue wire leads of the power supply cord from the noise filter.
3. Remove the single (1) screw holding the green/yellow wire lead to the base plate.
4. Remove the two (2) screws holding the cord anchorages upper and lower to the base plate.
5. Pull out the power supply cord from the hole in the rear cabinet.
6. Now, the power supply cord is free.

**Re-install**

1. Insert the power supply cord into the hole of the rear cabinet.
2. Hold the power supply cord to the bottom plate by fixing the cord anchorage upper and lower with the two (2) screws.
3. Earth the green/yellow wire lead of the power supply cord to the bottom plate with the single (1) screw.
4. Connect the brown and blue wire leads of the power supply to the noise filter referring to the Pictorial Diagram.
5. CARRY OUT 4R CHECKS.




## STOP SWITCH, UPPER LATCH SWITCH, LOWER LATCH SWITCH AND MONITOR SWITCH REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove control panel assembly, refer to “Control Panel Removal”.
3. Discharge high voltage capacitor.
4. Disconnect wire leads from each of the switches.
5. Remove two (2) screws holding latch hook to oven flange.
6. Remove latch hook assembly from oven flange.
7. Push downward on the one (1) stopper tabs holding each of the switches place.
8. Switches are free.
   At this time latch lever will be free, do not lose it.

**Re-install**

1. Re-install latch lever and each switch in its place, refer to Figure C-1.
2. Re-connect the wire leads to each switches and fuse holder.
   Refer to the pictorial diagram.
3. Secure the latch hook (with two (2) mounting screws) to the oven flange.
4. Make sure that monitor switch is operating properly.
   Refer to chapter “Test Procedure” and Adjustment procedure.

## STOP SWITCH, UPPER LATCH SWITCH, LOWER LATCH SWITCH AND MONITOR SWITCH ADJUSTMENT

If those switches do not operate properly due to a misadjustment, the following adjustment should be made.

1. Loosen the two (2) screws holding the latch hook to the flange on the oven front face.
2. With the door closed, adjust the latch hook by moving it back and forth and then adjust the latch hook by moving it back and forth. In and out play of the door allowed by the latch hook should be less than 0.5 mm.
3. Secure the screws with washers firmly.
4. Now, make sure of the upper and lower latch switches operations. If these latch switches are not activated with the door closed, loose the screws holding the latch hook to the oven cavity front flange and adjust the latch hook position.

**After the adjustment, make sure of the following:**

1. The in and out play of the door remains less than 0.5 mm at latched position.
2. The upper and lower latch switches interrupt the circuit before the door can be opened.
3. The monitor switch contacts close when the door is opened.
4. Re-install the outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

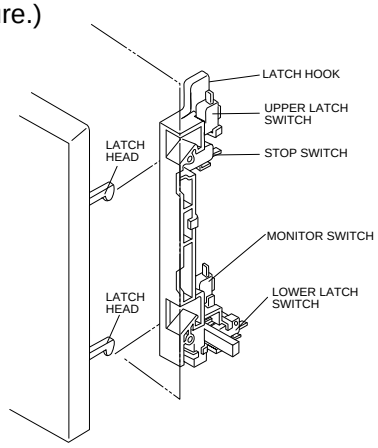



**Figure C-1. Latch Switches Adjustment**

# DOOR DISASSEMBLY

Remove door assembly, refer to “Door Replacement”.
Replacement of door components are as follows:

1. Place door assembly on a soft cloth with latches facing up.

Note: As the engaging part of choke cover and door panel are provided at several places, do not force any particular part.

2. Insert an putty knife (thickness of about 0.5mm) into the gap between the choke cover and corner portion of door panel as shown figure C-2 to free engaging parts.
3. Lift up choke cover.
4. Now choke cover is free from door panel.

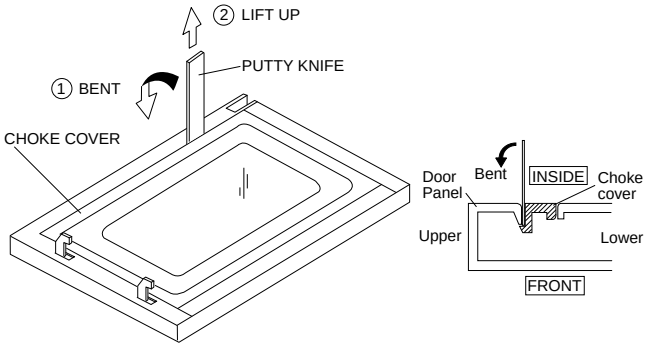



**Figure C-2. Door Disassembly**

# DOOR REPLACEMENT AND ADJUSTMENT

## DOOR REPLACEMENT

1. Disconnect oven from power supply and remove outer case.
   Remove turntable tray and roller stay from oven cavity.
2. Remove three (3) screws holding lower oven hinge.
3. Remove lower oven hinge from oven cavity bottom flange.
4. Remove door assembly from upper oven hinge on the oven.
5. Door assembly is now free.

Note: When individual parts are replaced, refer to “Door Disassembly”.

6. On re-installing door, insert the upper oven hinge into the door hinge pin.
   Then while holding door in place.
7. Make sure door is parallel with oven face lines (left and upper side lines) and the door latch heads pass through the latch holes correctly.
8. Insert the lower oven hinge into oven cavity bottom flange and then engage the door hinge pin.
   Then secure the lower oven hinge firmly with three (3) mounting screws.

Note: After any service to the door;

(A) Make sure that the upper and lower latch switches are operating properly.
   (Refer to chapter “Test Procedures”.)

(B) An approved microwave survey meter should be used to assure compliance with proper microwave radiation emission limitation standards.

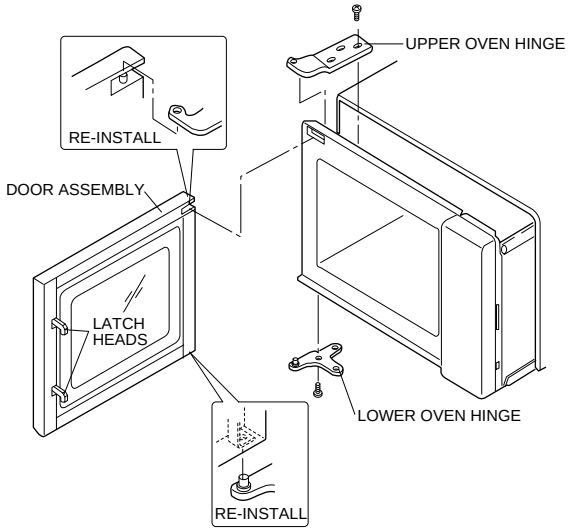
## DOOR ADJUSTMENT

The door is adjusted by keeping the screws of each hinge loose. The lower oven hinge can be loosened.

**After adjustment, make sure of the following :**

1. Door latch heads smoothly catch the latch hook through the latch holes, and the latch head goes through the center of the latch hole.
2. Deviation of the door alignment from horizontal line of cavity face plate is to be less than 1.0mm.
3. The door is positioned with its face depressed toward the cavity face plate.
4. Re-install outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

Note: The door on a microwave oven is designed to act as an electronic seal preventing the leakage of microwave energy from the oven cavity during the cook cycle. This function does not require that the door be air-tight, moisture (condensation)-tight or light-tight. Therefore, the occasional apperance of moisture, light or the sensing of gentle warm air movement around the oven door is not abnormal and do not of themselves, indicate a leakage of microwave energy from the oven cavity. If such were the case, your oven could not be equipped with a vent, the very purpose of which is to exhaust the vapor-laden air from the oven cavity.



# MICROWAVE MEASUREMENT

After adjustment of door latch switches, monitor switch and door are completed individually or collectively, the following leakage test must be performed with a survey instrument and it must be confirmed that the result meets the requirements of the performance standard for microwave oven.

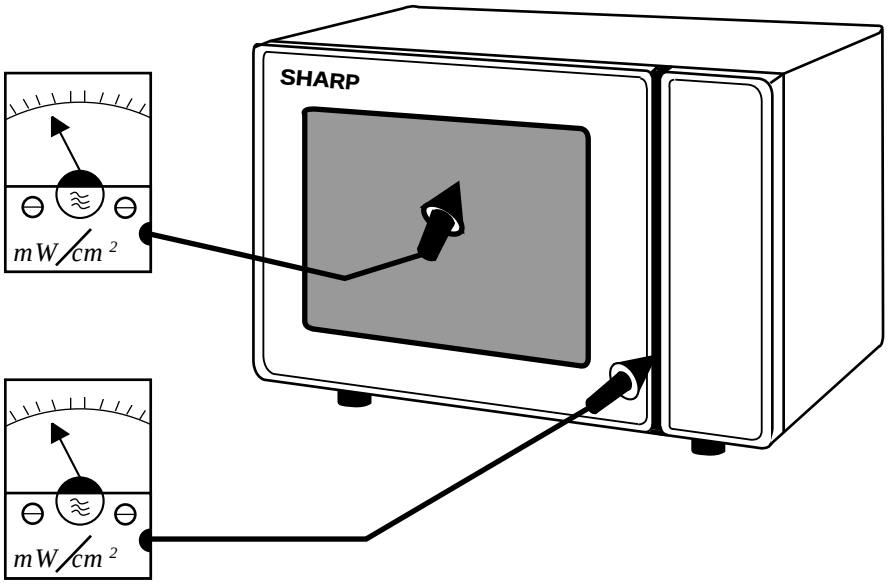
## REQUIREMENT

The safety switch must prevent microwave radiation emission in excess of 5mW/cm2 at any point 5cm or more from external surface of the oven.

## PREPARATION FOR TESTING:

Before beginning the actual test for leakage, proceed as follows;

1. Make sure that the test instrument is operating normally as specified in its instruction booklet.
   Important:
   Survey instruments that comply with the requirement for instrumentations as prescribed by the performance standard for microwave ovens must be used for testing.
   Recommended instruments are:
   NARDA 8100
   NARDA 8200
   HOLADAY HI 1500
   SIMPSON 380M
2. Place the oven tray into the oven cavity.
3. Place the load of 275 ± 15ml of water initially at 20 ± 5˚C in the centre of the oven tray. The water container should be a low form of 600 ml beaker with inside diameter of approx. 8.5cm and made of an electrically non-conductive material such as glass or plastic.
   The placing of this standard load in the oven is important not only to protect the oven, but also to insure that any leakage is measured accurately.
4. Close the door and turn the oven ON with the timer set for several minutes. If the water begins to boil before the survey is completed, replace it with 275ml of cool water.
5. Move the probe slowly (not faster that 2.5cm/sec.) along the gap.
6. The microwave radiation emission should be measured at any point of 5cm or more from the external surface of the oven.




**Microwave leakage measurement at 5 cm distance**

| SCHEMATIC |
|---|
| NOTE: CONDITION OF OVEN |
| 1. DOOR CLOSED. |
| 2. CLOCK APPERARS ON DISPLAY |

NOTE: ★ indicates components with potential above 250V.

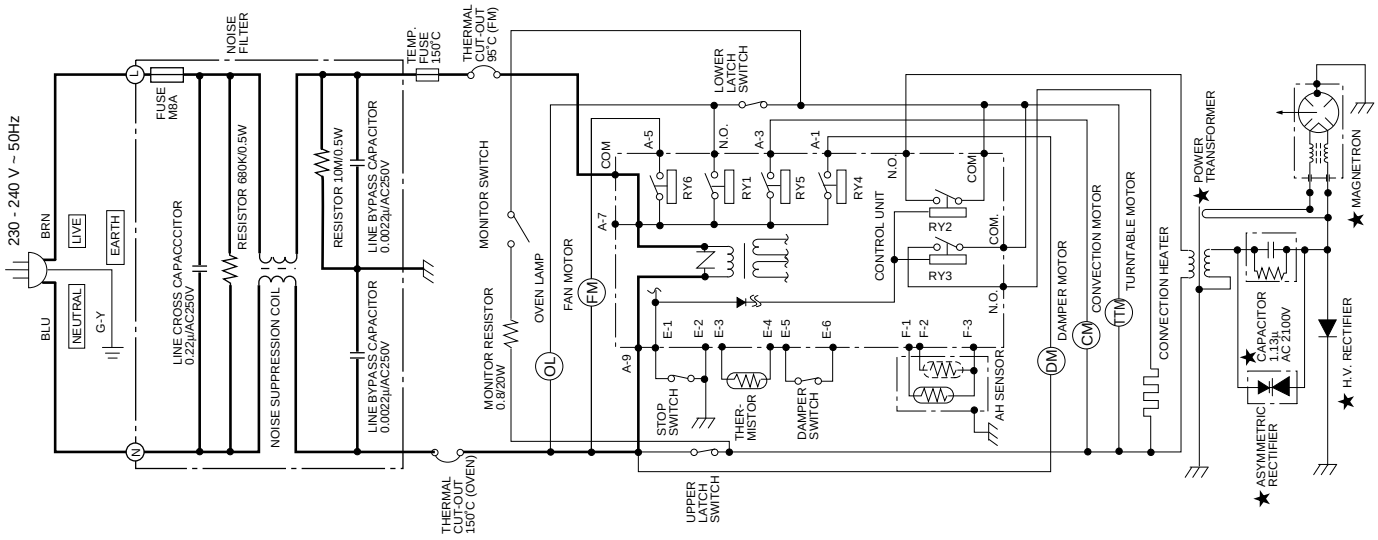



**Figure O-1. Oven Schematic-OFF Condition**

| SCHEMATIC |
|---|
| NOTE: CONDITION OF OVEN |
| 1. DOOR CLOSED. |
| 2.VARIABLE COOKING CONTROL “HIGH” |
| 3. COOKING TIME PROGRAMMED. |
| 4. START PAD TOUCHED. |

| SCHEMATIC |
|---|
| NOTE: CONDITION OF OVEN |
| 1. DOOR CLOSED. |
| 2. “EASY DEFROST” PAD TOUCHED. |
| 3. WEIGHT ENTERED. |
| 4. START PAD TOUCHED. |

| SCHEMATIC |
|---|
| NOTE: CONDITION OF OVEN |
| 1. DOOR CLOSED. |
| 2. “REHEAT SENSOR” PAD TOUCHED. |
| 3. START PAD TOUCHED. |

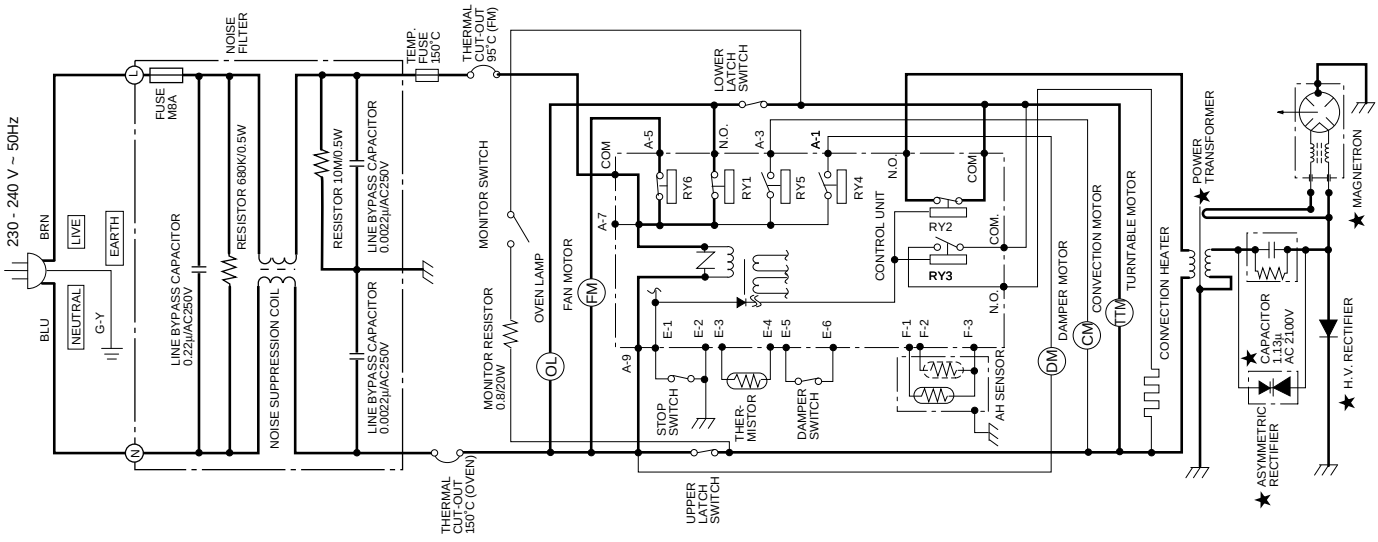



**Figure O-2. Oven Schematic-High or Easy Defrost or Reheat Sensor Cooking Condition**

SCHEMATIC

NOTE: CONDITION OF OVEN

1. DOOR CLOSED.
2. CONVECTION PAD TOUCHED.
3. DESIRED TEMP. PAD TOUCHED.
4. START PAD TOUCHED.

NOTE: ★ indicates components with potential above 250V.

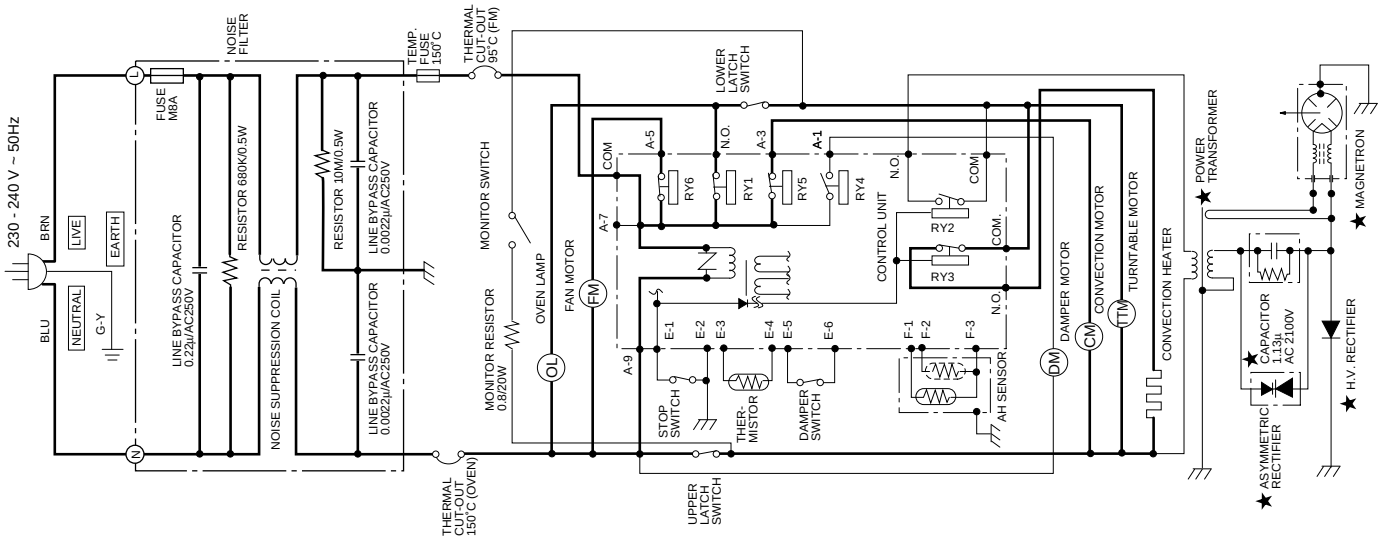



**Figure O-3. Oven Schematic-Convection Cooking Condition**

SCHEMATIC

NOTE: CONDITION OF OVEN

1. DOOR CLOSED.
2. MIX COOKING PAD TOUCHED.
3. COOKING TIME PROGRAMMED.
4. START PAD TOUCHED.

NOTE: Relay RY2 and RY3 operate alternately.

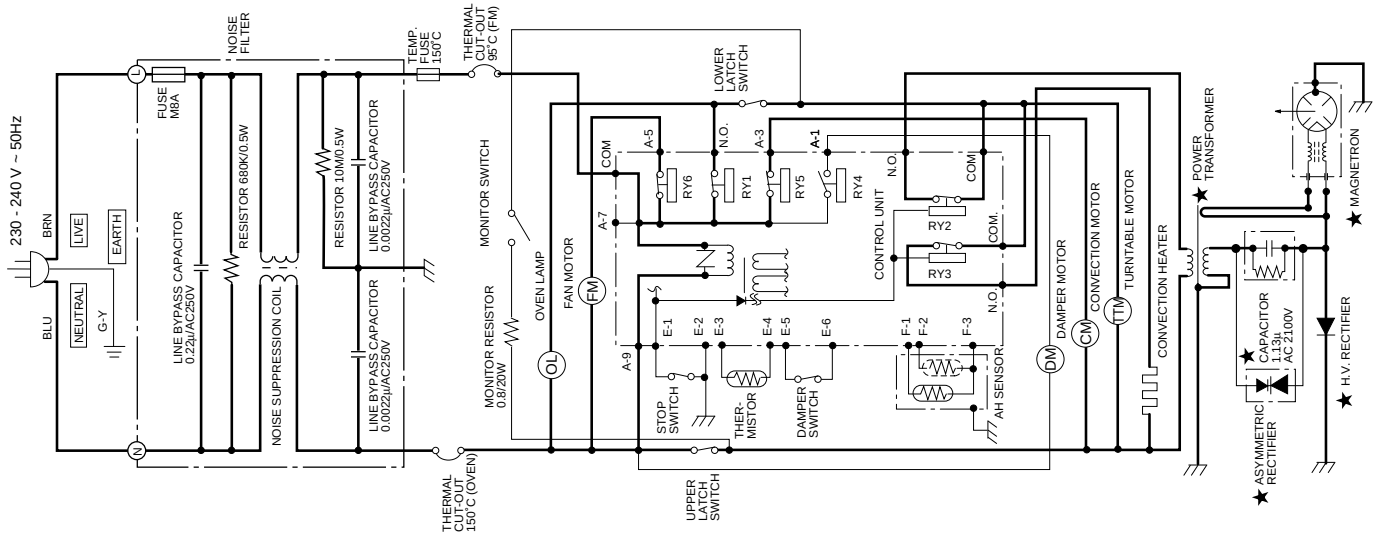



**Figure O-4. Oven Schematic-Automatic Mix Cooking Condition**

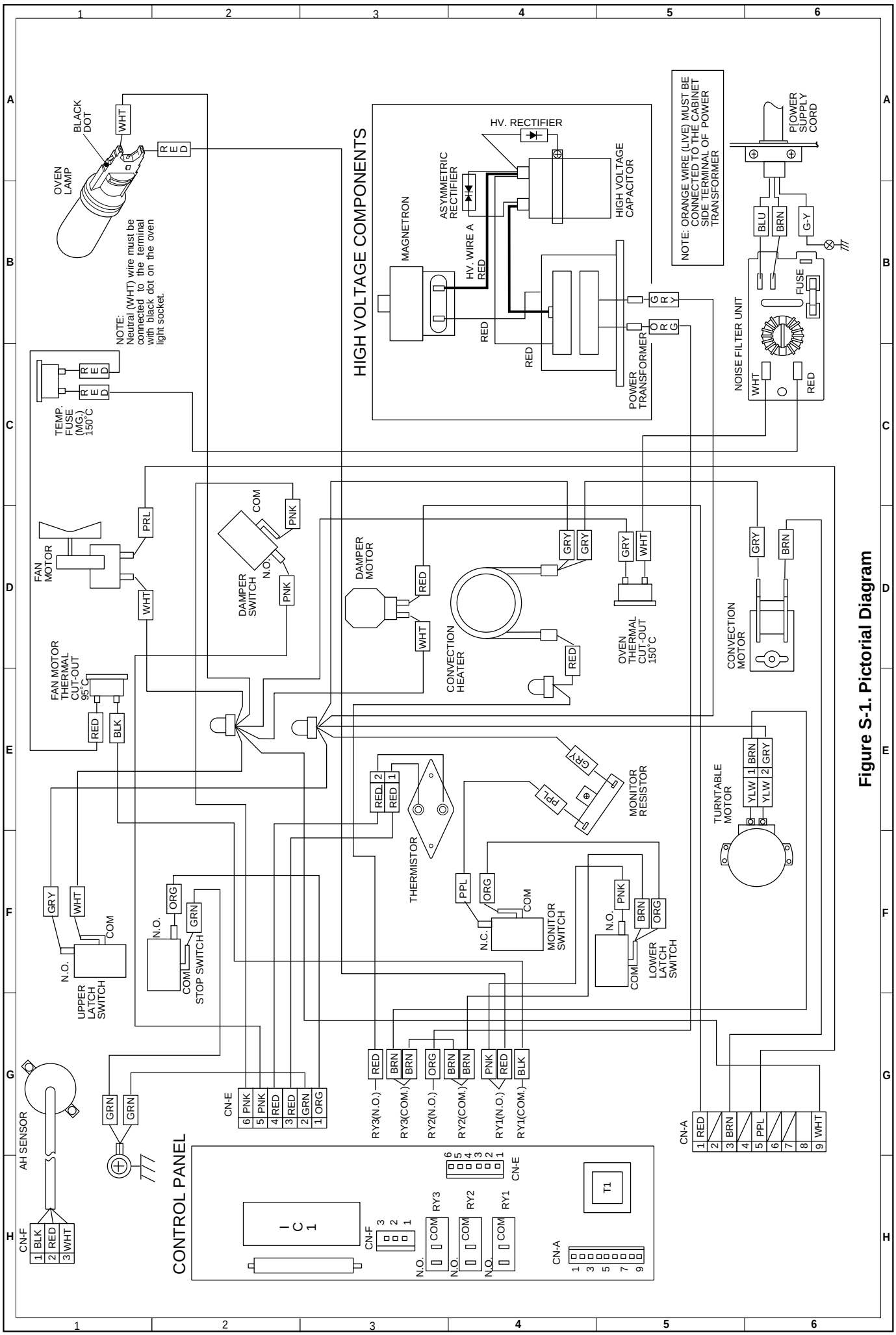



**Figure S-1. Pictorial Diagram**

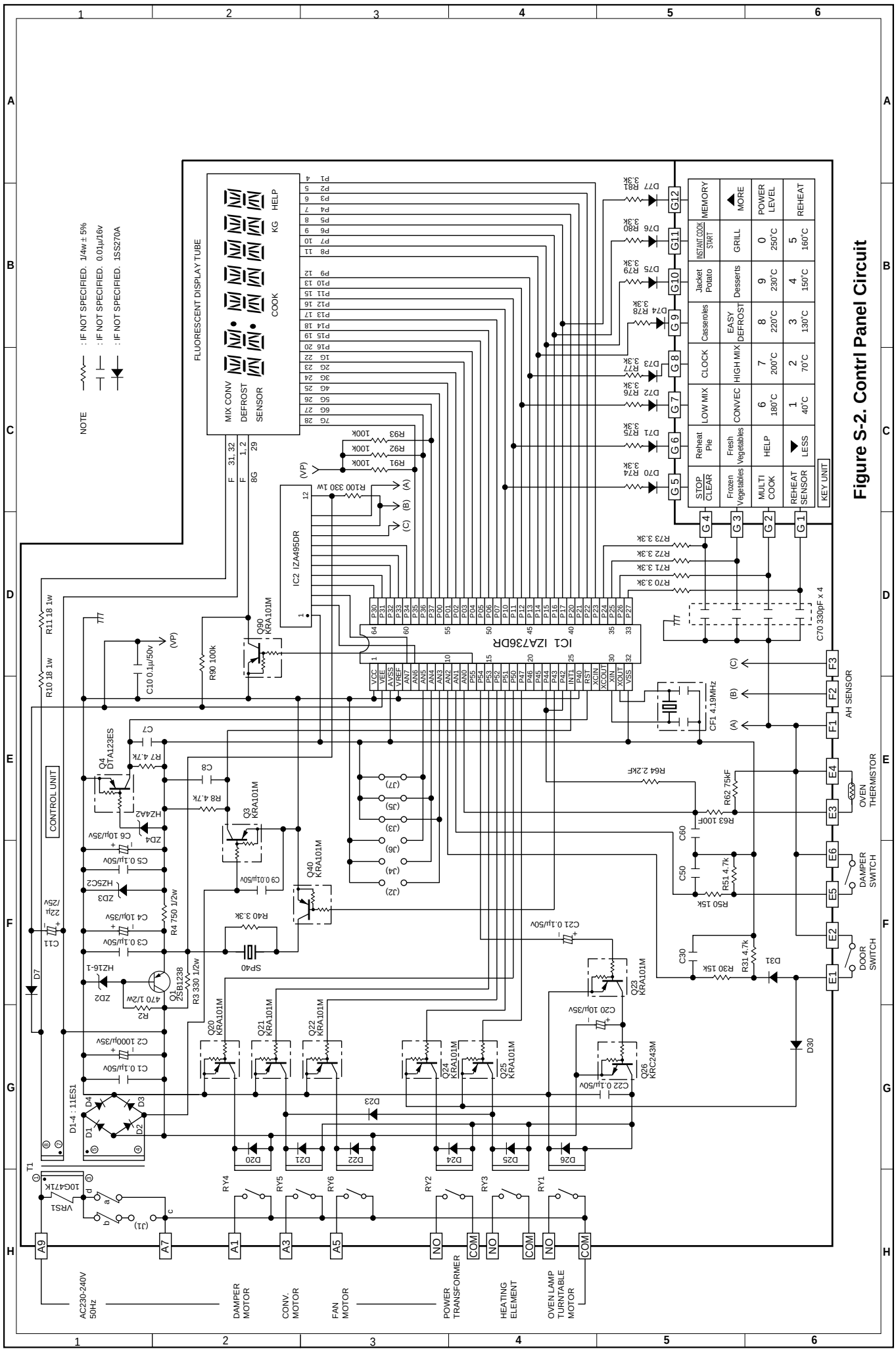



**Figure S-2. Contrl Panel Circuit**

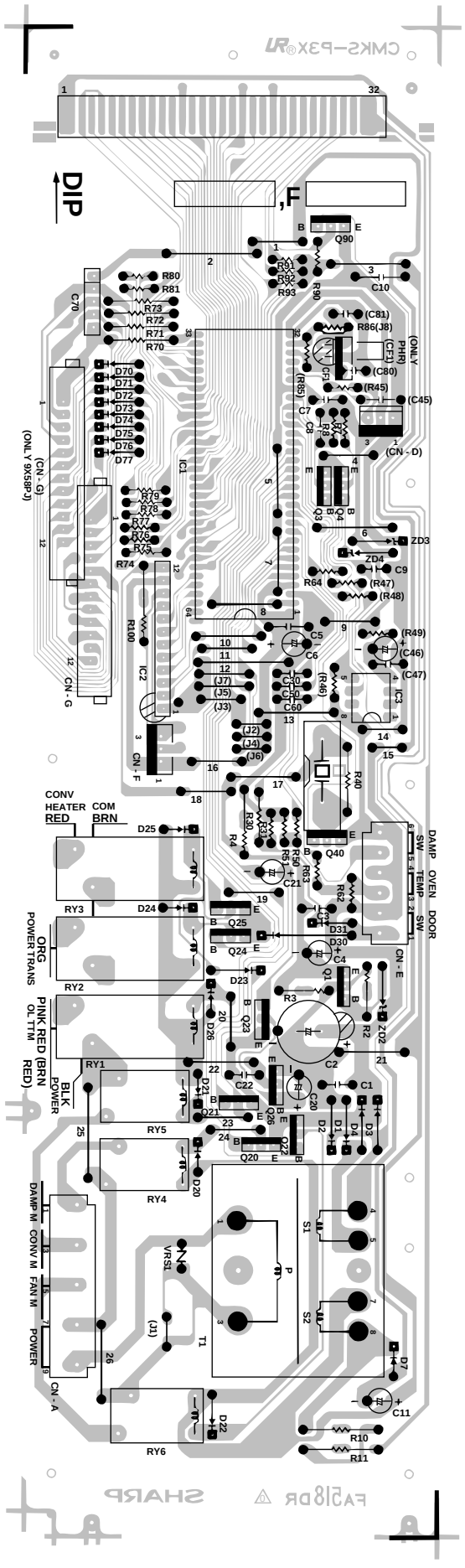



**Figure S-3. Printed Wiring Board**

# PARTS LIST

**Note: The parts marked "Δ" may cause undue microwave exposure.**
**The parts marked "*" are used in voltage more than 250V.**

| | REF. NO. | PART NO. | DESCRIPTION | Q'TY | CODE |
|---|---|---|---|---|---|
| | | | **ELECTRICAL PARTS** | | |
| * | 1- 1 | FH-DZA058WRK0 | High voltage rectifier assembly | 1 | AL |
| | 1- 2 | FH-HZA041WRE0 | Thermistor assembly | 1 | AN |
| | 1- 3 | QACCAA043WRE0 | Power supply cord | 1 | AW |
| | 1- 4 | QFS-CA010WRE0 | Fuse (M8A) | 1 | AE |
| | 1- 5 | QFS-TA013WRE0 | Temperature fuse 150˚C | 1 | AG |
| | 1- 6 | FPWBFA287WRK0 | Noise filter | 1 | AS |
| | 1- 7 | QSOCLA022WRE0 | Oven lamp socket | 1 | AG |
| | 1- 8 | QSW-MA111WRE0 | Monitor switch | 1 | AK |
| | 1- 9 | QSW-MA110WRE0 | Stop switch and Damper switch | 2 | AK |
| | 1-10 | QSW-MA110WRE0 | Upper and lower latch switches | 2 | AK |
| * | 1-11 | RC-QZA075WRE0 | High voltage capacitor | 1 | AU |
| | 1-12 | RHET-A139WRE0 | Convection heater | 1 | AY |
| | 1-13 | RLMPTA069WRE0 | Oven lamp | 1 | AK |
| | 1-14 | RMOTDA191WRE0 | Damper motor | 1 | AS |
| | 1-15 | RMOTDA097WRE0 | Turntable motor | 1 | AV |
| | 1-16 | RMOTEA303WRE0 | Cooling fan motor | 1 | AX |
| | 1-17 | RMOTEA284WRE0 | Convection motor | 1 | AZ |
| | 1-18 | RR-WZA003WRE0 | Monitor resistor 0.8Ω 20W | 1 | AG |
| | 1-19 | RTHM-A085WRE0 | Thermal cut-out 150˚C (OVEN) | 1 | AL |
| | 1-20 | RTHM-A079WRE0 | Thermal cut-out 95˚C (FM) | 1 | AL |
| * | 1-21 | RTRN-A318WRE0 | Power transformer | 1 | BP |
| Δ* | 1-22 | RV-MZA114WRE0 | Magnetron | 1 | BG |
| | 1-23 | FDTCTA157WRK0 | AH sensor assembly | 1 | AY |
| | | | **CABINET PARTS** | | |
| | 2- 1 | FDAI-A181WRY0 | Base plate assembly | 1 | AR |
| | 2-1-1 | GCOVHA156WRP0 | Turntable motor cover | 1 | AB |
| | 2-1-2 | XHTSD40P08RV0 | Screw; 4mm x 8mm | 1 | AA |
| Δ | 2- 2 | FHNG-A092WRM0 | Oven hinge (Lower) | 1 | AF |
| | 2- 3 | GCABDA074WRW0 | Rear cabinet | 1 | AG |
| | 2- 4 | GCABUA463WRP0 | Outer case cabinet | 1 | BF |
| | 2- 5 | PHOK-A043WRF0 | Latch hook | 1 | AM |
| | 2- 6 | GFTARA001WRW0 | Oven lamp access cover | 1 | AC |
| | 2- 7 | GLEGPA019WRE0 | Foot | 4 | AD |
| | 2- 8 | LBNDKA036WRP0 | Capacitor holder | 1 | AG |
| | 2- 9 | LBSHC0032WRE0 | Cord bushing | 1 | AB |
| | 2-10 | LSTPPA141WRF0 | Cord anchorage (Upper) | 1 | AD |
| | 2-11 | LSTPP0009YBF0 | Cord anchorage (Lower) | 1 | AC |
| Δ | 2-12 | MLEVPA122WRF0 | Latch lever | 1 | AD |
| | | | **CONTROL PANEL PARTS** | | |
| | 3- 1 | CPWBFA706WRK0 | Control unit (New Zealand only) | 1 | BT |
| | 3- 1A | QCNCMA227DRE0 | 5-pin connector(A) | 1 | AC |
| | 3- 1B | QCNCMA267DRE0 | 6-pin connector(E) | 1 | AC |
| | 3- 1C | QCNCMA237DRE0 | 3-pin connector(F) | 1 | AD |
| | 3- 1D | QCNCWA057DRE0 | 12-pin connector(G) | 1 | AF |
| | 3- 1E | RV-KXA077DRE0 | Fluorescent display tube | 1 | AY |
| | 3- 1F | PCUSGA381WRP0 | Cushion | 2 | AG |
| | C1 | RC-KZA087DRE0 | Capacitor 0.1µF 50V | 1 | AB |
| | C2 | VCEAB31VW108M | Capacitor 1000µF 35V | 1 | AF |
| | C3 | RC-KZA087DRE0 | Capacitor 0.1µF 50V | 1 | AB |
| | C4 | VCEAB31VW106M | Capacitor 10µF 35V | 1 | AA |
| | C5 | RC-KZA087DRE0 | Capacitor 0.1µF 50V | 1 | AB |
| | C6 | VCEAB31VW106M | Capacitor 10µF 35V | 1 | AA |
| | C7-8 | VCKYD11CY103N | Capacitor 0.01µF 16V | 2 | AH |
| | C9 | VCTYF31HF103Z | Capacitor 0.01µF 50V | 1 | AB |
| | C10 | RC-KZA087DRE0 | Capacitor 0.1µF 50V | 1 | AB |
| | C11 | VCEAB31EW226M | Capacitor 22µF 25V | 1 | AA |
| | C20 | VCEAB31VW106M | Capacitor 10µF 35V | 1 | AA |
| | C21 | VCEAB31HW104M | Capacitor 0.1µF 50V | 1 | AM |
| | C22 | RC-KZA087DRE0 | Capacitor 0.1µF 50V | 1 | AB |
| | C30 | VCKYD11CY103N | Capacitor 0.01µF 16V | 1 | AH |
| | C50 | VCKYD11CY103N | Capacitor 0.01µF 16V | 1 | AH |
| | C60 | VCKYD11CY103N | Capacitor 0.01µF 16V | 1 | AH |
| | C70 | RMPTEA009DRE0 | Capacitor array 330pF x 4 | 1 | AE |
| | CF1 | RCRS-A035DRE0 | Ceramic resonator (CST4.19MGW) | 1 | AG |
| | D1-4 | VHD11ES1///-1 | Diode (11ES1) | 4 | AB |
| | D7 | VHD1SS270A/-1 | Diode (1SS270ATA) | 1 | AA |
| | D20-26 | VHD1SS270A/-1 | Diode (1SS270ATA) | 7 | AA |
| | D30-31 | VHD1SS270A/-1 | Diode (1SS270ATA) | 2 | AA |
| | D70-77 | VHD1SS270A/-1 | Diode (1SS270ATA) | 8 | AA |
| | IC1 | RH-IZA736DRE0 | LSI | 1 | AX |

**Note: The parts marked "Δ" may cause undue microwave exposure.**
**The parts marked "*" are used in voltage more than 250V.**

| REF. NO. | PART NO. | DESCRIPTION | Q'TY | CODE |
|---|---|---|---|---|
| IC2 | RH-IZA495DRE0 | IC | 1 | AL |
| Q1 | VS2SB910MR/-4 | Transistor (2SB910M) | 1 | AE |
| Q3 | VSKRA101M//-3 | Transistor (KRA101M) | 1 | AB |
| Q4 | VSDTA123ES/-3 | Transistor (DTA123E) | 1 | AA |
| Q20-23 | VSKRA101M//-3 | Transistor (KRA101M) | 4 | AB |
| Q24-25 | VSKRA223M//-3 | Transistor (KRA223M) | 2 | AB |
| Q26 | VSKRC243M//-3 | Transistor (KRC243M) | 1 | AB |
| Q40 | VSKRA101M//-3 | Transistor (KRA101M) | 1 | AB |
| Q90 | VSKRA101M//-3 | Transistor (KRA101M) | 1 | AB |
| R2 | VRD-B12HF471J | Resistor 470 ohm 1/2W | 1 | AA |
| R3 | VRD-B12HF331J | Resistor 330 ohm 1/2W | 1 | AA |
| R4 | VRD-B12HF751J | Resistor 750 ohm 1/2W | 1 | AA |
| R7-8 | VRD-B12EF472J | Resistor 4.7k ohm 1/4W | 2 | AA |
| R10-11 | VRS-B13AA180J | Resistor 18 ohm 1W | 2 | AA |
| R30 | VRD-B12EF153J | Resistor 15k ohm 1/4W | 1 | AA |
| R31 | VRD-B12EF472J | Resistor 4.7k ohm 1/4W | 1 | AA |
| R40 | VRD-B12EF332J | Resistor 3.3k ohm 1/4W | 1 | AA |
| R50 | VRD-B12EF153J | Resistor 15k ohm 1/4W | 1 | AA |
| R51 | VRD-B12EF472J | Resistor 4.7k ohm 1/4W | 1 | AA |
| R62 | VRN-B12EK753F | Resistor 75k ohm(F) 1/4W | 1 | AA |
| R63 | VRN-B12EK101F | Resistor 100 ohm(F) 1/4W | 1 | AA |
| R64 | VRN-B12EK222F | Resistor 2.2k ohm(F) 1/4W | 1 | AA |
| R70-81 | VRD-B12EF332J | Resistor 3.3k ohm 1/4W | 12 | AA |
| R90-93 | VRD-B12EF104J | Resistor 100k ohm 1/4W | 4 | AA |
| R100 | VRS-B13AA331J | Resistor 330 ohm 1W | 1 | AA |
| RY1-3 | RRLY-A083DRE0 | Relay (OMIF-S-118LM) | 3 | AK |
| RY4-6 | RRLY-A078DRE0 | Relay (OJ-SS-118LM) | 3 | AG |
| SP40 | RALM-A014DRE0 | Buzzer (PKM22EPT) | 1 | AG |
| T1 | RTRNPA089DRE0 | Transformer | 1 | AU |
| VRS1 | RH-VZA032DRE0 | Varistor (10G471K) | 1 | AE |
| ZD2 | VHEHZ161///-1 | Zener diode (HZ16-1) | 1 | AA |
| ZD3 | VHEHZ5C2///-1 | Zener diode (HZ5C-2) | 1 | AA |
| ZD4 | VHEHZ4A2///-1 | Zener diode (HZ4A2) | 1 | AA |
| 3- 2 | FPNLCB249WRK0 | Control panel frame with key unit | 1 | BB |
| 3- 2-1 | FUNTKA769WRE0 | Key unit | 1 | BA |
| 3- 2-2 | HPNLCA800WRF0 | Panel grill | 1 | AL |
| 3- 3 | JBTN-A766WRF0 | Open button | 1 | AG |
| 3- 4 | MSPRCA050WRE0 | Open button spring | 1 | AB |
| 3- 5 | LANGTA197WRW0 | Control panel back plate | 1 | AK |
| 3- 6 | MLEVFA057WRW0 | Open lever | 1 | AE |
| 3- 7 | NSFTTA042WRE0 | Open shaft | 1 | AE |
| 3- 8 | XEPSD30P10XS0 | Screw ; control unit mtg. | 3 | AA |
| 3- 9 | XCPSD40P12000 | Screw ; control panel back plate mtg. | 4 | AA |

## OVEN PARTS

| | | | | | |
|---|---|---|---|---|---|
| | 4- 1 | FBRGMA002WRE0 | Bearing assembly | 1 | AQ |
| | 4- 2 | FDUC-A124WRW0 | Steam duct assembly | 1 | AN |
| | 4- 3 | NFANJA020WRE0 | Cooling fan | 1 | AE |
| | 4- 4 | FFTA-A034WRK0 | Damper ass'y | 1 | AM |
| Δ | 4- 5 | FOVN-A316WRY0 | Oven cavity | 1 | AX |
| | 4- 6 | FROLPA072WRK0 | Roller stay | 1 | AL |
| | 4- 7 | LANGFA089WRW0 | Chassis support | 1 | AE |
| | 4- 8 | LANGQA407WRW0 | Convection motor mounting plate | 1 | AG |
| | 4- 9 | LANGQA213WRW0 | Lamp socket mounting angle | 1 | AE |
| | 4-10 | LANGQA369WRP0 | Thermal cut-out mounting angle | 1 | AB |
| | 4-11 | LANGTA196WRW0 | Bearing mounting plate | 1 | AD |
| | 4-12 | LBNDK0054WRE0 | Heater element holder | 2 | AB |
| | 4-13 | LFIX-A013WRW0 | Bearing holder plate | 1 | AB |
| | 4-14 | LHLDKA009WRF0 | Cord holder | 1 | AD |
| | 4-15 | MCAMPA030WRF0 | Damper cam | 1 | AC |
| Δ | 4-16 | MHNG-A165WRM0 | Oven hinge (upper) | 1 | AE |
| | 4-17 | NBLTKA005WRE0 | Convection fan belt | 1 | AF |
| | 4-18 | NCPL-A021WRF0 | Turntable coupling | 1 | AE |
| | 4-19 | NFANMA019WRW0 | Convection fan | 1 | AE |
| | 4-20 | PCUSGA236WRP0 | Cushion | 1 | AC |
| | 4-21 | NPLYBA025WRF0 | Pulley (F) | 2 | AC |
| | 4-22 | NSFTTA114WRE0 | Damper shaft | 1 | AB |
| | 4-23 | NTNT-A019WRH0 | Turntable tray | 1 | AT |
| | 4-24 | PCOVPA301WRE0 | Waveguide cover | 1 | AE |
| | 4-25 | PCOVPA292WRF0 | AH sensor cover | 1 | AD |
| | 4-26 | PCUSGA410WRP0 | Transformer cushion D | 1 | AD |
| | 4-27 | PCUSUA424WRP0 | Magnetron duct cushion | 1 | AG |
| | 4-28 | PCUSUA196WRP0 | Cushion | 2 | AD |
| | 4-29 | PCUSUA425WRP0 | Cushion | 1 | AG |
| | 4-30 | PCUSUA197WRP0 | Steam cushion C | 2 | AD |
| | 4-31 | FDUC-A279WRK0 | Heater duct assembly | 1 | AT |

**Note: The parts marked "Δ" may cause undue microwave exposure.**
**The parts marked "*" are used in voltage more than 250V.**

| | REF. NO. | PART NO. | DESCRIPTION | Q'TY | CODE |
|---|---|---|---|---|---|
| | 4-32 | PDUC-A269WRW0 | Damper duct | 1 | AK |
| | 4-33 | PDUC-A270WRF0 | Cooling fan duct | 1 | AL |
| | 4-34 | PFPF-A138WRE0 | Thermal protection sheet (Left) | 1 | AK |
| | 4-35 | PREFHA028WRW0 | Thermal protection plate (Left) | 1 | AS |
| | 4-36 | PFPF-A139WRE0 | Thermal protection sheet (Right) | 1 | AF |
| | 4-37 | PGLSPA485WRE0 | Oven lamp screen | 1 | |
| | 4-38 | PREFHA053WRW0 | Thermal protection plate (Right) | 1 | AQ |
| | 4-39 | PCUSUA167WRP0 | Cushion | 2 | AF |
| | 4-40 | PFPF-A064WRE0 | Thermal protection sheet | 1 | AE |
| | 4-41 | PSKR-A153WRW0 | Air guide (Bottom) | 1 | AK |
| | 4-42 | PSKR-A171WRW0 | Magnetron air guide | 1 | AF |
| | 4-43 | PSKR-A161WRW0 | Air guide (Right) | 1 | AF |
| | 4-44 | LANGQA065WRP0 | Noise unit angle | 1 | AD |

## DOOR PARTS

| | | | | | |
|---|---|---|---|---|---|
| Δ | 5 | CDORFA747WRK0 | Door assembly, complete. | 1 | BS |
| Δ | 5- 1 | DDORFA711WRY0 | Door panel | 1 | BG |
| | 5- 2 | GCOVHA155WRF0 | Choke cover | 1 | AP |
| | 5- 3 | GWAKPA142WRF0 | Door frame | 1 | AT |
| | 5- 4 | HDECQA123WRF0 | Door sash (right) | 1 | AF |
| | 5- 5 | HDECQA124WRF0 | Door sash (left) | 1 | AF |
| Δ | 5- 6 | LSTPPA045WRF0 | Upper latch head | 1 | AB |
| Δ | 5- 7 | LSTPPA046WRF0 | Lower latch head | 1 | AB |
| | 5- 8 | MSPRTA163WRE0 | Latch spring | 1 | AD |
| | 5- 9 | NSFTTA044WRE0 | Latch shaft | 1 | AC |
| | 5-10 | PGLSPA487WRE0 | Door glass | 1 | BC |

## MISCELLANEOUS

| | | | | | |
|---|---|---|---|---|---|
| | 6- 1 | FAMI-A087WRM0 | High rack | 1 | AW |
| | 6- 2 | FAMI-A088WRM0 | Low rack | 1 | AW |
| | 6- 3 | TCADCA546WRR0 | Cook book | 1 | AZ |
| | 6- 4 | TINSEA684WRR0 | Operation manual | 1 | AK |
| | 6- 5 | TLABNA191WRR0 | Menu label | 1 | AD |
| | 6- 6 | FW-VZB534WRE0 | Main wire harness | 1 | BC |
| * | 6- 7 | QW-QZA202WRE0 | High voltage wire A | 1 | AK |
| | 6- 8 | TSPCNC359WRR0 | Name plate | 1 | AF |
| | 6- 9 | FW-VZB342WRE0 | Thermistor harness | 1 | AN |
| | 6-10 | TCAUHA214WRR0 | Caution label | 1 | AF |

## SCREWS, NUTS AND WASHERS

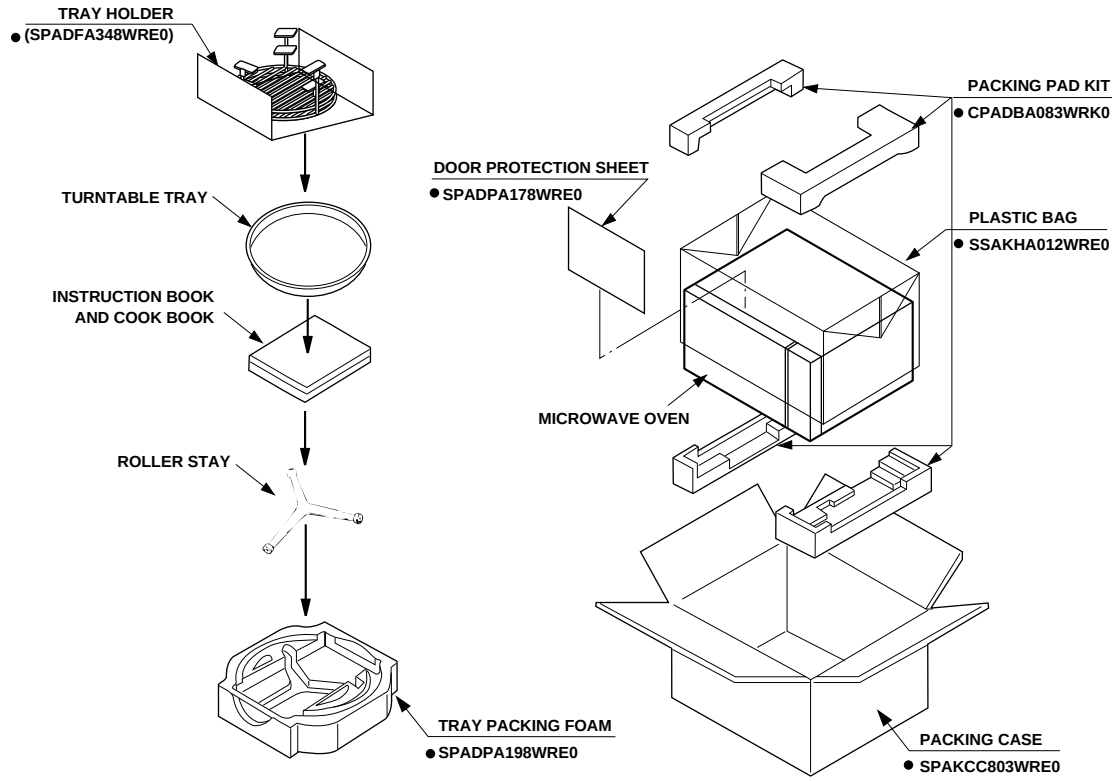
| | | | | | |
|---|---|---|---|---|---|
| | 7- 1 | XHTSD40P08RV0 | Screw; 4mm x 8mm | 6 | AA |
| | 7- 2 | LX-BZ0202WRE0 | Special screw | 2 | AB |
| | 7- 3 | LX-CZA020WRE0 | Special screw | 6 | AA |
| | 7- 4 | XCTWW40P08000 | Screw; 4mm x 8mm | 2 | AA |
| | 7- 5 | XCBWW30P06000 | Screw; 3mm x 6mm | 4 | AA |
| | 7- 6 | LX-CZ0052WRE0 | Special screw | 2 | AA |
| | 7- 7 | XBPSD40P06KS0 | Screw; 4mm x 6mm | 2 | AA |
| | 7- 8 | XOTWW40P10000 | Screw; 4mm x 10mm | 13 | AA |
| | 7- 9 | XBPSD30P14K00 | Screw; 3mm x 14mm | 1 | AA |
| | 7-10 | XOTSD40P12RV0 | Screw; 4mm x 12mm | 11 | AA |
| | 7-11 | XBPSD40P25000 | Screw; 4mm x 25mm | 2 | AA |
| | 7-12 | XFPSD40P25000 | Screw; 4mm x 25mm | 2 | AA |
| | 7-13 | LX-CZA030WRE0 | Special screw | 2 | AA |
| | 7-14 | XBTWW40P06000 | Screw; 4mm x 6mm | 8 | AA |
| | 7-15 | XCPSD30P06000 | Screw; 3mm x 6mm | 5 | AA |
| | 7-16 | XWVSD60-07000 | Washer; 6mm x 0.7mm | 1 | AA |
| | 7-17 | XCPSD30P08X00 | Screw; 3mm x 8mm | 6 | AA |
| | 7-18 | XCPSD30P08000 | Screw; 3mm x 8mm | 3 | AA |
| | 7-19 | XCPSD40P08000 | Screw; 4mm x 8mm | 7 | AA |
| | 7-20 | XCTSD40P08000 | Screw; 4mm x 8mm | 7 | AA |
| | 7-21 | XFPSD30P08000 | Screw; 3mm x 8mm | 2 | AA |
| | 7-22 | XFPSD40P08K00 | Screw; 4mm x 8mm | 5 | AA |
| | 7-23 | XFPSD40P08000 | Screw; 4mm x 8mm. | 5 | AA |
| | 7-24 | XFPSD60P14JS0 | Screw; 6mm x 14mm | 2 | AC |
| | 7-25 | XNESD40-32000 | Nut; 4mm x 3.2mm | 4 | AA |
| | 7-26 | XNEUW40-32000 | Nut; 4mm x 3.2mm | 1 | AA |
| | 7-27 | XOTSE40P12000 | Screw; 4mm x 12mm | 4 | AA |
| | 7-28 | LX-WZA004WRE0 | Washer | 1 | AA |
| | 7-29 | XOTSD40P12000 | Screw; 4mm x 12mm | 8 | AA |
| | 7-30 | XWSUW40-10000 | Washer; 4mm x 1mm | 1 | AA |
| | 7-31 | LX-WZA022WRE0 | Washer | 1 | AA |
| | 7-32 | LX-CZA060WRE0 | Special screw | 1 | AC |

HOW TO ORDER REPLACEMENT PARTS

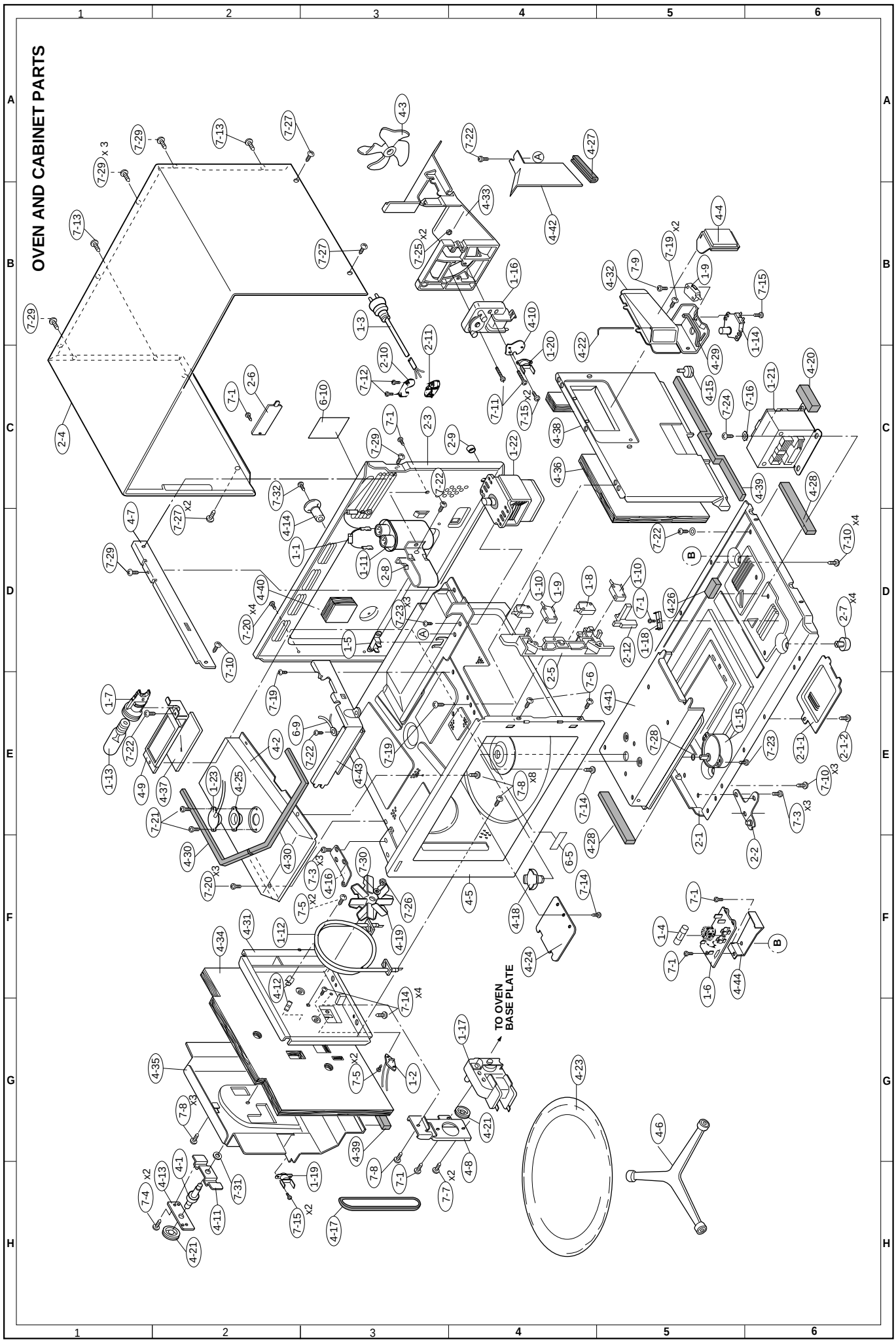
To have your order filled prompty and correctly, please furnish the following information.

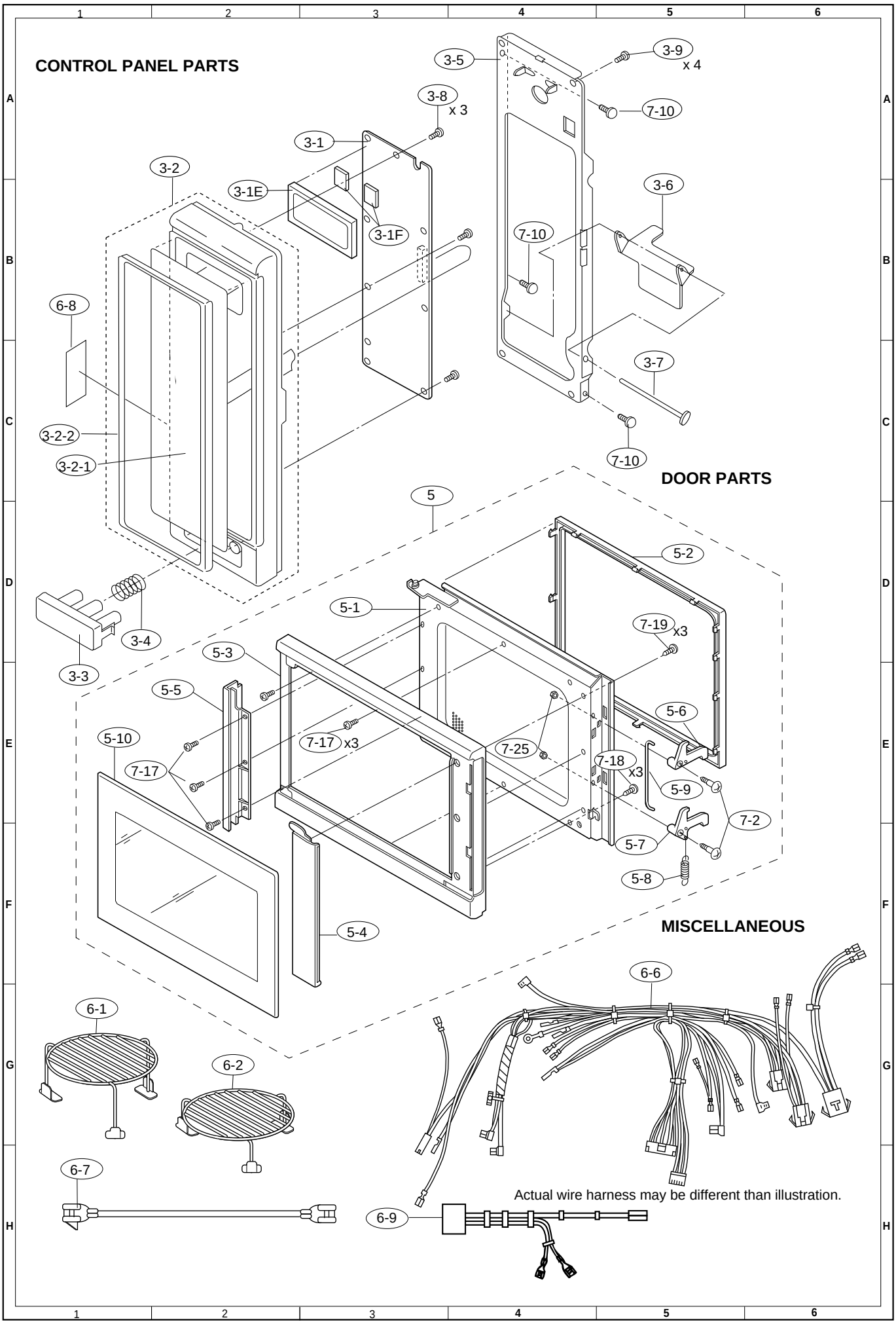
1. MODEL NUMBER 2. REF. NO.
3. PART NO. 4. DESCRIPTION

**PACKING AND ACCESSORIES**




● **Not replaceable items.**


OVEN AND CABINET PARTS
TO OVEN BASE PLATE

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